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Major manpower and social problems encountered by developing countries in the process of industrial development, and action to be taken both at the national and international levels comprise the substantive focus of this document. The document is a collection of papers prepared by the International Labor Office. Part I, "Manpower for Industry," addresses problems such as the determination of goals, quantitative and qualitative, to be achieved in the education and training of skilled industrial manpower; the special role of industry itself in development of skills; and measures to insure the best possible use of available skilled manpower. Part II, "Other Policy Issues" concerns the active participation of different social groups in industrialization, job displacement resulting from industrialization, and sharing the proceeds of industrial development. Three types of international action were discussed: (1) provision of advice, equipment, and qualified technical personnel under technical cooperation programs, bilateral and multi-lateral, (2) financial assistance, and (3) joint action by developing countries which share common problems. (CH)

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Geneva, 1967

INTERNATIONAL LABOUR OFFICE

Human Resources for Industrial Development

Some Aspects of Policy and Planning

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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INTRODUCTION

This volume is a collection of papers prepared by the International Labour Office for an international symposium planned by the newly established United Nations Industrial Development Organisation to follow the series of regional symposia held in 1966. The purpose of the papers is to identify some of the major manpower and social problems encountered by developing countries in the process of industrial development, and to discuss action that needs to be taken both at national and at international levels if these problems are to be solved.

The interest of the I.L.O. in these matters is twofold: it is concerned to make its contribution to the process of industrial development which has a vital role to play in providing the resources for social progress; and the I.L.O. also has special responsibilities for helping member countries to ensure that workers share fully, both as consumers and as producers, in the fruits of industrial development.

As may be seen from the table of contents, the papers in this volume fall into two groups. Part I, entitled " Manpower for Industry ", comprises four papers devoted to problems of training and utilising manpower for industrial development. Problems discussed include—

(a) determination of goals, quantitative and qualitative, to be achieved in the education and training of skilled industrial manpower;

(b) the development of coherent and efficient systems, including provision of adequate legislative and administrative support, and the establishment of national industrial training organisations, for attaining these goals;

(c) the special role of industry itself in development of skills;

(d) measures to ensure the best possible use of available skilled manpower;

(e) the contributions that international action can make to enable the developing countries to formulate and implement effective programmes of training for industrialisation.

Part II of the volume, entitled " Other Policy Issues ", likewise contains four papers. That on " Social Participation in Industrial Development " stresses the importance of enlisting the co-operation and active participation of different social groups, particularly employers and workers and their organisations, in the processes of industrialisation, and discusses the purposes that such participation may serve and the forms that it may take. The paper on " Employment Aspects of Industrialisation " suggests a number of reasons why, unless appropriate measures are taken, less labour may be employed in the industrial sector in developing countries than it would be economically worthwhile and socially desirable to employ, and discusses various approaches to the problem of providing more productive employment in industry. One of the most important of these approaches is discussed at greater length in the following paper, entitled " Progressive Industrial Technology in Developing Countries ". Finally, a paper on wages and industrial development points out that the success of a country's efforts to promote industrial development, as well as the way in which the proceeds of industrial development are shared, will depend partly upon the level, structure and rates of increase of wages and salaries, and discusses various problems that arise in this connection.

Action needed to deal with the manpower and social problems of industrial development has, of course, mainly to be taken in the countries concerned. But some forms of international action can contribute to the solution of these problems, and it was considered appropriate, in papers prepared for discussion at an international symposium, to devote special attention to the possibilities that exist for useful international action. Three types of international action can contribute to national policies for industrial manpower: *(a)* provision of advice, equipment and qualified technical personnel under technical co-operation programmes, bilateral and multilateral; *(b)* financial assistance; and *(c)* joint action by developing countries themselves sharing common problems. Suggestions are made in the papers regarding all three types of action. In connection more particularly with the first of these types of international action, some information is given about ways in which the I.L.O. is equipped and ready to help member States on request in dealing with the manpower and social planning of industrial development.

PART I

MANPOWER FOR INDUSTRY

1. SKILL REQUIREMENTS FOR INDUSTRIALISATION

OBJECT AND SCOPE OF PAPER

The purpose of this paper is limited but important. It is to help in defining national and international action needed to determine the skill requirements of industrial development in low-income countries. Action needed to meet these skill requirements is considered below in papers Nos. 2 and 3. The discussion below is concerned with determining needs for skilled personnel.

The importance of programming or planning in this field is twofold. On the one hand, success in industrial development depends in part on the availability of skills, and it is the task of planning in this field to ensure that the skills are available at the appropriate moment. The productivity of plant and equipment is low when the managers and workers handling them are of low capability. Domestic investment may then become not a help to progress but a burden on communities already very poor; and foreign investors may be deterred when no skilled manpower can be recruited or trained. On the other hand, the cost of providing skills is high[1]: training too much or too many in some fields and too little or too few in others, and recruiting manpower abroad that could well have been trained at home, places unnecessary burdens on poor nations. It is therefore another task of planning in this field to determine the optimal balance of quantity and quality in skill formation.

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[1] It is almost impossible to provide a comprehensive measure of the cost of skill provision. But one indicator may help to suggest an order of magnitude. Jacob MINCER (*The Journal of Political Economy*, Oct. 1962, Supplement, p. 55), using a very broad concept of training and an indirect method of determining its cost, estimated that, for instance, in 1958 in the United States total life-time investment in training per male amounted to $7,700 for those whose educational level did not extend beyond elementary school. In that year gross domestic product per head at factor cost in the United States amounted to $2,324 (both figures in current prices). The former sum is well over three times the annual product per head. A more restricted concept of training (e.g. excluding part of general education and some of the "learning by experience") would, perhaps, reduce this ratio considerably, to, say, twice the annual product per head. Even then the cost of training of this group of relatively low skill would be quite considerable. For males with high-school and college education Mincer's figures of total investment were more than twice and seven times higher, respectively, than for the first group.

In view of the discussion of on-the-job training later in this paper, it is perhaps of interest to note that, of the $7,700 mentioned above, less than one-third was attributed to the cost of all forms of formal schooling and the rest to on-the-job training.

The focus of the following discussion is on decisions to be taken by public policy makers. Each country has some facilities for skill formation —the general education system, some enterprises in which workers can be trained, and possibly some schools or centres for vocational training. Also, each government has some means of control over the provision and utilisation of such facilities; the budget may provide for increasing numbers of schools and teachers, the law may compel certain types of firms to provide specific kinds of training, the central bank may provide foreign exchange for study abroad, vocational guidance may be given, fellowships provided, and attractive salaries fixed with a view to inducing young people to seek certain kinds of training rather than others, and so on. Furthermore, many governments have some degree of control over the recruitment of foreign manpower to fill gaps in the national labour force. This paper does not discuss what these controls should be or how they should be exercised. It is concerned instead with questions of calculating what public policy should try to make these various sources of skill provide: what a country should want or need from them.

This statement of the problem corresponds to the " target-setting approach to human resources planning ".[1] It provides a basis, first, for deciding what facilities for skill formation should be provided in the country concerned; and second, for deciding what should be done to induce people to make use of these facilities. The former aspect is of special relevance to the problems discussed in paper No. 2.

The reason for discussing these questions at some length is that they are difficult, and yet were not until recently recognised as involving major issues of policy.[2] There are two main problems. First, there is the problem of matching the costs and benefits of skills already referred to: better-qualified personnel produce more but they also cost more, and it will be necessary to determine where the optimum lies. Second, difficulties arise owing to the time factor. A period of several years may separate the beginning of study and training from its completion; by this time the usefulness of a particular skill may be much below that of other skills for which no provision had been made at the outset. Moreover, many training facilities (school buildings, specialised equipment and teachers), once installed, cannot be used for entirely different programmes without considerable loss.

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[1] Frederick Harbison and Charles A. Myers: *Education, Manpower and Economic Growth* (New York, Toronto, London, McGraw-Hill, 1964), pp. 202 ff.

[2] Considering people as " human resources ", in which investments can be made on the basis of calculations of costs and benefits, seems repugnant. This may be a major reason why systematic analysis of manpower has long been neglected in the study of economic development as compared with, for instance, physical capital and financial questions.

The main concerns of the present paper may now be stated in these terms: by what methods and on the basis of what kinds of information should current public decisions regarding the future provision of industrial skills be taken in order that these decisions be as nearly optimal as possible? This leads to the further question as to what services are needed at the national level to collect this information, to analyse it and to translate the findings into concrete policy decisions. Since present approaches to the problem rely heavily on international comparisons, this in turn raises the question as to how useful information can be assembled and exchanged on an international basis. Finally, some questions of international action and policy arise from the fact that international exchange of manpower (especially highly qualified manpower) is an important source of skill provision.

The discussion that follows is divided into four sections. First, a simple outline is given of the various types of decisions that have to be taken at any time concerning the provision of industrial skills and of the types of information about future manpower needs on which these decisions should be based. Second, sources of obtaining such information and methods of analysing it are presented and illustrated and it is noted to what extent they meet requirements and what practical questions they leave unanswered. Third, some data concerning manpower requirements are applied to specific industries, the development of which was recommended by the Regional Symposia that have preceded the present International Symposium. This may give some idea of at least the relative difficulty of meeting manpower requirements in these different industries, and it may help in focusing national and international action needed to meet these requirements. Fourth, some conclusions are suggested regarding national and international action for determining industrial skill requirements.

DECISIONS AND TARGETS FOR SKILL FORMATION

As this paper is concerned with target-setting and public decision-making for the development of industrial skills, the sources of such skills should be briefly considered. Different sources will be required according to the nature of the skill to be provided, according to the method of providing it, or both. Hence the time needed for skill development will also be different, i.e. decisions taken now can yield results in the near future for some of the sources, but only in a more distant future for others. Thus, the type of information needed for target-setting regarding various sources of skill is also different; rather detailed data concerning short-term manpower requirements are wanted for some sources, more global figures about long-term requirements for others. In all cases this information must include estimates of future production, about the kinds of work it would involve, and about technology.

Sources of Skills

Four sources of skills may be distinguished:

(a) general education;

(b) formal institutions for specific vocational preparation at secondary and tertiary levels such as technical schools, colleges and universities;

(c) on-the-job training;

(d) foreign countries.

(a) *General Education.*

The functions of general education are far broader than the provision of skills for industrial development. But all advanced industrial skills require some level of general attainment in the use of language, reasoning and mathematics, such as is taught at general schools. Furthermore, ability to adapt from one type of work to another is enhanced by a relatively high level of properly oriented general education. This is important when industrialisation involves fast technological change. It is also important because, as noted later in this paper, precise forecasts of skill requirements are impossible, so that trained personnel must be adaptable. For these reasons the planning of general education should be part of the decision-taking processes with which this paper is concerned. In other words, the " manpower approach " to planning of general education is necessary, even though it is by no means sufficient for such planning. Quantitative manpower targets to be met by the general education system should be calculated as a basis for action in that field. In practice, the main bottlenecks of general education systems in developing countries from this point of view are at the secondary-school level.[1]

(b) *Training Institutions.*

Several types of formal training institutions provide various levels of specific vocational preparation (including retraining) as distinct from general education. Thus, lower- and higher-stage vocational and technical schools exist at secondary educational level: at the lower stage more or less specific vocational skills in trades such as woodwork and metalworking are taught; at the higher stage a variety of scientific, technological, commercial and other fields may be covered. At a yet higher level training takes place in the form of university and equivalent education. Most formal training institutions are provided by public authorities as part of a country's education system. But others may be provided and operated by industrial enterprises acting singly or jointly.

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[1] HARBISON and MYERS, op. cit., pp. 57, 81 and 111.

(c) *On-the-Job Training.*

On-the-job training includes a variety of arrangements whose common feature is that they are carried out wholly or largely within the enterprise by which the learner is employed. On-the-job training includes apprenticeship programmes, but also less formal arrangements. It is provided for semi-skilled and skilled workers as well as for higher ranks such as middle-management categories. Much on-the-job training is arranged for workers and employees newly recruited by the enterprise, but highly developed programmes exist also to prepare workers for higher grades of work, or for new methods of production.

For a broad range of skills, learning on the job and courses at schools are alternative training methods between which the future worker must make a choice. Public policy makers, too, must decide whether to encourage, within this range, the development of one rather than the other method, both generally and in specific fields of training (e.g. for various types of skilled workers and technicians). One important aspect of the problem is that for many types of training the cost of one method (assuming roughly equal efficiency of application) is much lower than that of the other. This question is considered further in paper No. 2 below, where it is submitted that training on the job is the more efficient method in a far wider range of cases than that in which it is actually applied.

For present purposes another difference between the two methods is important, namely the necessary advance calculation of industrial skill requirements to be met. For two reasons this is simpler in the case of training on the job than in special institutions. First, whereas instructors and equipment used for training in an enterprise can normally also be used for production, the staff and installations of schools often cannot; most of the latter's useful life is entirely committed to training. Hence, when deciding whether to provide training facilities and on what scale, the specific training use to be made of them can be forecast over a shorter term for training on the job than for formal institutions. Second, decisions to train specific persons on the job are usually linked directly to concrete jobs. These decisions normally rest with the employer and involve him in some cost and inconvenience: he decides in the light of his own production and investment plans. Decisions to set up schools often rest with public authorities and are based on some general expectation that over the years enough people will be using them to warrant their establishment. Moreover, participation in training at schools is normally at the initiative of the trainee, in the expectation that his new skill will eventually stand him in good stead. But this expectation may never be realised. For example the trainee may ultimately be employed in an occupation for which a different kind of training would have been more useful or cheaper. Even when employed in the occupation for which he was trained he may find his skills to be too advanced, or not advanced enough, or based on a different technology from that used in his job.

So, for a number of reasons further discussed in paper No. 2, it seems important in the provision of industrial skills to follow two general principles:

(i) Training of employed persons in connection with their jobs (" training in employment ") should be preferred to training outside the framework of an employment relationship.[1]

(ii) Wherever possible training within enterprises should be preferred to training in schools or other formal institutions.

Training in employment places considerable responsibility on employers, while reducing that of public authorities. It consists largely —but not always wholly—of training within the enterprise. For some kinds of training formal courses in outside institutions (schools or centres) are preferable or indispensable (see paper No. 2). Even then the employer, or an employers' association, or an industrial board may set up the school, or assume all or part of the cost of an employee's training in a public or private institution.

The main task of public policy in this case would be to ensure that industrial employers did in fact discharge these responsibilities adequately in accordance with a predetermined target. This target would serve the public authorities as a basis for financial incentives, technical assistance and facilities, and legal compulsion where necessary and appropriate, as further discussed in paper No. 2.

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[1] In developing countries " pre-employment trade and technical training in secondary schools is probably a waste of both time and resources " (HARBISON and MYERS, op. cit., pp. 56, 68, 82, 96 and 123). See also Philip J. FOSTER: " The Vocational School Fallacy in Development Planning ", in C. A. ANDERSON and M. J. BOWMAN (editors): *Education and Economic Development* (Chicago, Aldine Publishing Company, 1965); Robert L. THOMAS: " High-Level Manpower in the Economic Development of Uganda ", in Frederick HARBISON and Charles A. MYERS (editors): *Manpower and Education* (New York, Sydney, Toronto, London, McGraw-Hill, 1965).

(d) *Training Abroad and the Employment of Expatriate Manpower.*

From the point of view of the present paper, training abroad and the employment of expatriate manpower may be regarded as balancing items. Training abroad is useful when there are no facilities at home—whether because of lack of foresight or because of the cost. Employing expatriate manpower fills gaps in national skill availabilities arising out of unexpected needs or mere short-term requirements, e.g. consultancy services or the training of national personnel by foreign firms supplying and installing new industrial plant and equipment.

Time Spans to Be Envisaged

Decisions for providing sources of skill must be based on targets to be attained in the future. The period for target-setting is the time needed for the decisions to yield their results. To consider shorter periods would be useless; to look at longer periods may be unnecessary. The appropriate time span depends on the following factors:

(i) the period of learning needed to acquire the skill;

(ii) when new facilities are to be provided: the period of planning and constructing buildings, acquiring equipment and providing national or expatriate teaching staff;

(iii) when the number of trainees is to increase: the time needed to attract learners.

When new facilities are to be provided it is also necessary to consider to what extent these are likely to be needed in the more distant future, and whether the investment in new buildings and equipment is justified.

The length of target periods in years differs for the various types and methods of skill provision. For most purposes one or more of three typical time spans will be relevant, i.e. the short term (less than three years), the medium term (from about three to seven years) and the long term (more than seven years).

(a) For secondary general education, the period for target-setting must be long, as this is, *inter alia,* the first stage in acquiring a wide range of advanced industrial skills. While long-term programming is hazardous and subject to great uncertainty, in the case of general education this is somewhat offset by the fact that the programming need not be detailed. Often (in so far as the supply of industrial manpower is

concerned) only a distinction between scientifically and commercially oriented curricula is needed.

(b) In the case of formal technical education, greater precision in estimates of future requirements is needed than in the case of general education, because of the higher degree of specialisation involved. But the period to be considered is shorter, and thus medium-term forecasts are often helpful. However, when expensive new facilities are needed, involving elaborate equipment (e.g. university departments of engineering), time must be added for preparation of construction and finance, and estimates have to be made of long-term needs.

(c) On-the-job training, being linked to specific jobs and conducted in large part with instructors and equipment that can also be used for production, calls for much less advance planning than do formal education and training. It can be undertaken, and facilities made available, when a specific need arises. Some general foresight is, of course, indispensable. Management should provide in its investment and production plans the spare capacity and time needed for ensuring that new recruits are trained and established workers upgraded to the extent called for by normal turnover and by growth in the labour force. The introduction of new products or of new methods and equipment may call for considerable retraining, and the enterprise's engineering staff who designed the new product or method should be available for this purpose. When ordering new equipment it may be necessary to stipulate that the enterprise supplying it will also help in retraining workers and higher employees. There is also some need for highly skilled staff to keep abreast of technological progress of interest to the enterprise.

(d) The main difference between training abroad and at home is that in the latter case teachers and instructors must be provided, and training requirements for such personnel have to be foreseen long in advance. So it seems rational that a large proportion of technical assistance experts sent to developing countries should be specialists in the training of teachers and instructors.[1] This means that education and training in developing countries can expand fast. It may also mean that in planning for the distant and very uncertain future some reliance should continue to be placed on foreign supply of teachers and instructors (whether through technical assistance or otherwise).

Some forward planning would then seem indispensable. Technical assistance programmes have encountered considerable difficulties in recruiting staff with the very high qualifications that this costly source of manpower should supply. If such programmes are to continue and even grow in the future, some manpower planning at the international level will be needed as badly as it is at the national level. Furthermore, at lower levels of education and training, the language barriers reduce the extent to which foreign teachers and instructors can be employed.

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[1] HARBISON and MYERS: *Education, Manpower and Economic Growth*, op. cit., p. 16; in 1963, out of 82,000 technical assistance experts provided by O.E.C.D. countries, 38,000 were teachers.

Decisions to Be Taken

Summarising the preceding sections it may be said that public authorities responsible for the provision of skill have, at any point of time, to take two main types of decisions:

(a) those concerning the provision of sources of skill, national and foreign;

(b) those concerning vocational guidance (including provision of scholarships and other appropriate incentives) of persons available for training through various facilities.

Each type of decision needs to aim at attaining targets for each of the sources of skill. At primary schools pupils can be given some guidance as to whether or not to seek entry into secondary general schools, and in choosing manual or non-manual occupations of various kinds. At secondary general schools guidance can be given with a view to channelling the right proportions of pupils directly towards specific occupations (or even specific enterprises), higher-stage secondary technical schools and various kinds of university training.

Simultaneously, decisions have to be taken (with reference to the targets chosen) as to the expansion or contraction of various kinds of formal training institutions, the expansion or redirection of schemes for training in employment, the recruitment of foreign manpower, and study abroad.

Although these decisions will all have an impact in the future, for some this future is near, for others distant. Vocational guidance for school leavers not continuing formal study must to some considerable extent be related to the immediate situation in the employment market. For those continuing formal study, the occupational outlook must be of longer term, the longer and more expensive are the studies concerned. Similarly, while decisions to recruit expatriate manpower should be based on immediate requirements, those concerning the expansion of national training facilities should be based on expectations regarding the more or less distant future.

INFORMATION NEEDED AND AVAILABLE

Targets for industrial skill formation in the short, medium and long run must be derived from estimates of industrial output and technology. The present paper is concerned with this derivation—not with the making of production forecasts. Something must be said, however, about the actual availability of such forecasts. Future productivity, an important indicator of the level of technology, also raises some serious problems in determining manpower requirements.

Forecasts of both output and productivity become less detailed and reliable as the period considered lengthens. Yet the amount of information needed for decisions on training increases as this period becomes longer, for the scope and impact of decisions taken at any moment, while quite limited in the immediate future, are greater over longer periods.

Decisions regarding industrial skill formation should be based on some estimate of production, but they should also take account of the broader context of industrial development. First, provision should be made for the highly skilled manpower needed for industrial research and development. Although developing countries can rely to a large extent on technical knowledge applied in advanced countries, they should make some provision for research and development for new products and methods in addition to current industrial output, if they are to develop industries capable of capturing significant shares in the international markets for manufactures.

Second, even though the estimated manpower requirements of industrial development should play a major part in decisions regarding the scale and direction of training and educational programmes, it would be wrong not to take account of the high-level manpower requirements of other sectors. Both casual observation and ample statistical evidence show that people with quite similar education and training are engaged in widely differing occupations. So, if enough manpower is trained for estimated industrial needs but not for other purposes (e.g. agriculture, government services) some of this manpower will be employed in other sectors, leaving a gap in industry.

Production Forecasts

For present purposes the most interesting questions of short-term output expectations (i.e. for one or two years) are what new industrial plants are likely to be established and what existing ones substantially expanded. It should not be difficult to obtain reasonably accurate answers to these questions from inquiries among existing enterprises and from such government agencies as may be concerned with the establishment of new plants. In centrally planned economies most short-term enterprise plans are quite precise, and relatively certain to be approximately implemented, as regards both output and manpower input. In market-oriented economies greater flexibility (and hence uncertainty) exists in these respects, but the short term raises no very great problems and in any event little can be done to remedy them.

Medium-term production estimates (i.e. for a period of about five years) are of great importance because over such a time span decisions regarding vocational guidance and the provision of training facilities can have a considerable impact on the actual supply of skills. It is therefore of great help that such estimates are now often available as targets of national development plans. These are often based on thorough and realistic estimates of what is feasible and desirable, in industry as well as in other sectors, and may include estimates of manpower requirements and measures to meet them. It would indeed seem essential for realistic development plans to include manpower planning, that is, for the kinds of decisions discussed in this paper to be made an integral part of the over-all plan, but except in the centrally planned economies this is rarely done.[1]

Plans prepared without regard for human resources are perhaps not likely to be realistic in other respects. Although their output targets can be used as a source of information for manpower planning, they may well have to be checked against other sources, such as employers' estimates or actual developments in other countries in comparable conditions. In any case plans cannot be regarded as statements of what will happen in the future; rather, they are forecasts of what is likely to happen if the measures they propose are taken and have the effects expected of them by the planners. In this sense plans in most developing countries have not proved particularly reliable guides.[2]

It is perhaps partly owing to the unreliability of comprehensive development plans in some cases that some developing countries have refrained from establishing them. One source of information on which to base targets and decisions of skill provision is then missing. But this does not remove the need for setting targets and taking decisions. So other sources of information, less systematic and perhaps less reliable than a comprehensive development plan, must be found. Manpower planning cannot wait until a country has prepared such a plan and all relevant information is available. Naturally, manpower decisions that are integrated into general plans and based on copious information can be better than those that are not. But decisions based on careful consideration of even very incomplete data, even without the framework of an over-all development plan, are less likely to prove seriously wrong than decisions taken at random or on grounds of mere short-term political expendiency.

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[1] For instance, it has been found that in Latin America few of the plans prepared in recent years pay explicit attention to manpower aspects; Eighth Conference of American States Members of the International Labour Organisation, Ottawa, 1966, Report II, *Manpower Planning and Employment Policy in Economic Development* (mimeographed), p. 105.

[2] For a pessimistic assessment of plan experience see Andrew WATSON and Joel B. DIRLAN: "The Impact of Underdevelopment on Economic Planning", in *Quarterly Journal of Economics*, May 1965.

The above considerations are particularly relevant to long-term output expectations (i.e. for more than ten years). For long and very long periods it may not be possible to go further than making more or less reasonable assumptions about the level of, and rates of increase in, over-all output subdivided into two or three sectors. Yet even estimates of such a global nature can be useful for certain types of manpower decisions—although it is of course convenient if somewhat more refined " perspective plans " are available.

Manpower Targets

Converting output expectations into targets of skill provision is a complex process. Its precise nature depends in part on the time span to be considered, and on the types of information available both on the output expectations and on the relationships between output and skill requirements. Some of this information has to be obtained from the country in question itself. But in judging the possible future course of a developing country's economic system it is often useful to examine the actual experience of other countries that have already passed the stage upon which the former country is about to enter.

In recent years a number of methods have been developed to estimate skill requirements. All these methods are deficient in many ways; yet they all help to raise the level of decision-taking above the haphazard and the short-sighted. However, nearly all systematic methods of forecasting skill requirements or setting targets for meeting these requirements concern general education. Much less attention has been paid to vocational education, and almost none to training in employment.

Below some of these methods are briefly reviewed. The purpose of this review is threefold:

(i) to illustrate the nature of the work involved in preparing rational decisions;

(ii) to indicate the kind of national facilities needed for this purpose;

(iii) to indicate what contributions could be made by international action.

Long-Term Targets.

It is simplest to begin with the case of long-term problems in which little information is available in the way of output expectations. In that case there are few variables to consider.

Thus, the Tinbergen-Correa model enables educational requirements to be determined at secondary and tertiary level, for sequences of six-year periods.[1] To this end the model assumes a certain rate of future growth in global production, certain fixed relationships between this output and the required numbers of workers with secondary and third-level education, certain teacher-student ratios and a six-year study period at each level. The numbers of persons with secondary and third-level education assumed to be needed per $1,000 million volume of annual production were derived from United States data.

TABLE I. EDUCATIONAL REQUIREMENTS ACCORDING TO THE TINBERGEN-CORREA MODEL FOR TWO CASES OF GROWTH OF OUTPUT

	Case A: 30 per cent. growth per six-year period				Case B: 40 per cent. growth per six-year period			
	Base year	1st period	2nd period	3rd period	Base year	1st period	2nd period	3rd period
Volume of production (1,000 million 1940 dollars):	100	130	169	219	100	140	196	274
Educational requirements (millions):								
Manpower with secondary education	20.0	26.0	33.7	43.7	20.0	28.0	39.2	54.8
Manpower with third-level education . .	2.45	3.19	4.14	5.35	2.57	3.60	5.02	7.03
Students in secondary schools	9.4	12.2	15.8	20.5	12.0	16.8	23.5	32.9
Students in third-level institutions . . .	0.98	1.27	1.65	2.15	1.29	1.80	2.54	3.53
Manpower with secondary education and less than six years' employment	6.2	8.0	10.5	13.6	7.2	10.1	14.1	19.8
Manpower with third-level education and less than six years' employment . . .	0.76	0.98	1.27	1.66	0.93	1.29	1.80	2.54

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[1] Jan TINBERGEN: "Quantitative Adaptation of Education to Accelerated Growth", in Herbert S. PARNES (editor): *Planning Education for Economic and Social Development* (Paris, O.E.C.D., 1963), pp. 159 ff.

Illustrative results of this model for an 18-year period are as given in table I.[1] Case A concerns an assumption of 30 per cent. growth of national output per six years, or 4.47 per cent. per annum; in Case B growth is assumed to be 40 per cent. per six years or 5.77 per cent. per annum.

The model also makes it possible to calculate how many more persons with second- and third-level education will be needed if the rate of growth is to be stepped up from 30 per cent. to 40 per cent. per period. Furthermore, it specifies how the use of foreign manpower can shorten the period of transition from the lower to the higher rate.

The limitations of this model are obvious. For instance, the assumed ratios may not be valid for many countries and they will be constant in none. There is no distinction between major economic sectors and occupational groups. As a result, there is no distinction between the various types of secondary and third-level education to be developed; length of study is certainly not uniformly six years; and so on. But the model does make explicit the main interrelated variables of output and education to be considered. It also provides a first approach to balanced development of a country's educational system where no detailed information is available on which to base expectations regarding these matters. Of course, when additional information does exist, this should be substituted for or added to the original presentation of the model.[2]

At the same time, a search should be made for methods and data enabling reasonable forecasts to be made for developing countries of more specific indicators of skill requirements as a basis for target-setting. Especially as regards the long and medium term it seems clear that comparative international experience can be an important source of such data.

International Comparisons.

The general use of international comparison as a tool for projecting national trends was recently stated in the following terms:

> There are two bases for projecting the future evolution of any social unit: its own past experience and the experience of other similar units. All economic forecasting methods represent some blend of these two approaches. At one extreme, the past history of a country may be formalised in an econometric model and predictions determined from assumptions as to the future values of the exogenous variables in the model. In this approach, the experience of other economies is drawn on in estimating some of the parameters in the model,

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[1] The model is known to have been applied in practice in China (Taiwan), Greece, Spain and Turkey; see O.E.C.D.: *Econometric Models of Education* (Paris, 1965) and H. F. McCusker, Jr., in Société française de recherche opérationnelle: *Recherche opérationnelle et problèmes du tiers-monde* (Paris, Dunod, 1964).

[2] A less limited version of the model is that by J. Tinbergen and H. C. Bos in *Econometric Models of Education*, op. cit.

in choosing the values of exogenous variables, and in judging the plausibility of the results. At the other extreme, generalisations from common experience in the form of patterns or stages of growth form the analytical core around which projections are built up. In this case the relation between the two approaches is reversed; the model of the particular economy serves to modify the conclusions reached from comparative analysis.

The choice of analytical techniques is more limited in less developed countries than it is in advanced ones. Econometric models based on time series for the country concerned have proven to be of very limited value, both because of the scarcity of historical data and because some of the structural relations are undergoing significant changes. Therefore plans and projections for these countries must rely more heavily on international experience, both of countries at a similar stage of development and of those that are more advanced.[1]

In an early and simple application of this principle to the setting-up of guideposts for long-term national educational development, Professor Harbison derived from comparative international data some " rules of thumb " relating annual rates of increase in required numbers of high-level manpower to desired rates of over-all economic growth.[2] More recently, on the basis of more advanced statistical data permitting of more refined analysis, a number of interesting systematic relationships were established by the Unit for Economic and Statistical Studies on Higher Education of the London School of Economics and Political Science.[3]

In this study variables of interest to long-term planning of vocational guidance and skill formation are related to output per worker as an indicator of the level of economic development. From data concerning from eight to 13 countries productivity was calculated, for the economy as a whole and for major economic sectors (i.e. the eight one-digit sectors of the International Standard Industrial Classification of All Economic Activities). Inter-country differences in productivity were then correlated with the following indicators of manpower development:

(a) distribution of the labour force within sectors by " major occupational groups " (i.e. Major Groups 0, 1, 2 and 3 of the International Standard Classification of Occupations);

(b) educational attainments of the labour force within four major occupational groups;

(c) educational attainments of the labour force by economic sector;

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[1] Hollis B. CHENERY, with Lance TAYLOR: *Intercountry and Intertemporal Patterns of Industrial Growth*, Interegional Seminar on Long-Term Economic Projections (United Nations), Elsinore, Denmark, August 1966.

[2] International Institute for Labour Studies: *Lectures on the Labour Force and Its Employment* (Geneva, 1963), pp. 40 and 41.

[3] P. R. G. LAYARD and J. C. SAIGAL: " Educational and Occupational Characteristics of Manpower: An International Comparison ", in *British Journal of Industrial Relations* (London School of Economics and Political Science), Vol. IV, No. 2, July 1966, pp. 222 ff.

(d) proportions of certain high-level minor occupational groups in the national labour force as a whole.

All data and findings related to years around 1960.

The provisional findings of the study may be illustrated as follows:

(a) A 1 per cent. increase in productivity in the manufacturing sector tends to be associated with increases in the proportion, within the manufacturing labour force, of professional, technical and related workers of 1.01 per cent., administrative, executive and managerial workers of 0.32 per cent., clerical workers of 0.54 per cent. and sales workers of 0.48 per cent.

(b) A 1 per cent. increase in productivity in the economy as a whole tends to be associated with certain percentage increases in the proportions of workers in the above occupational groups holding degrees, having completed secondary school, attained matriculation level, completed middle schooling, or completed only primary schooling.

(c) A 1 per cent. increase in productivity in the combined manufacturing and electricity sectors tends to be associated with a 1.02 per cent. increase in the proportion of the labour force in these sectors having completed secondary school or higher education and a 0.76 per cent. increase in the proportion of those having had middle schooling.

(d) A 1 per cent. increase in productivity in the economy as a whole tends to be associated with a 0.81 per cent. increase in the proportion, in the national labour force, of architects, engineers, surveyors, scientists, draughtsmen, and science and engineering technicians combined.

A somewhat similar analysis was recently undertaken in the I.L.O.[1] In this case employment in the ten major I.S.C.O. groups was related to national income per head, but also to the rate of economic growth and to the size of a country's population. On this basis, using projections of economic growth made by P. N. ROSENSTEIN RODAN, total employment in the major groups was projected for each of the regions distinguished in the United Nations demographic statistics for the world as a whole, for the years 1970, 1975 and 1980.

Again, some of the limitations of international comparisons of this nature are clear. They can be applied to any national situation to a limited extent only. Thus, although less advanced countries may gain some impression of skills available in the labour force of more advanced nations, these are not necessarily the skills needed—i.e. the skills countries would have provided if, over a number of years, they had practised manpower planning, in full knowledge of the costs and production benefits of various kinds of training and education and about the future development of their economies, and if all countries placed the same value on and could afford the same level of education as an end in itself as distinct from a prerequisite of production.[1] Also, the manpower structure of countries that advanced earlier to a certain level of development is adapted to technologies that may be out of date, or inappropriate for other reasons, when newly industrialising countries reach that level. Besides, comparisons in terms of whole economies and broad economic sectors suffer from the fact that the composition of output and employment within such aggregates differs widely, so that no precise conclusions can be drawn.

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[1] James G. SCOVILLE: *The Structure of Labour Demand, 1960-1980,* Interregional Seminar on Long-Term Economic Projections, Elsinore, Denmark, August 1966.

Apart from these difficulties in interpreting international comparisons, problems arise in making them. Thus, the small number of countries on which the United Kingdom study is based reflects the general shortage of data. Such data as exist are often incomparable without considerable adjustment—for instance regarding levels of educational attainment.

Many other shortcomings and qualifications of international comparisons and their use in long-term manpower planning could be added to the above. Yet in spite of these inadequacies it would seem that relationships based on such comparisons provide some guidance in national long-term target-setting for education and vocational training. Conditions and expectations in any individual country can be compared with international " patterns ". Deviations between the two do not mean that a country should blindly follow the pattern. But they will raise questions as to the reasons for the discrepancy and thus provoke either more explicit justification of national policies or their correction.

Medium-Term Targets.

As already noted, medium-term forecasts of skill requirements must be more specific than long-term estimates because greater specialisation in training and education is needed to meet requirements (see page 12); they *can* be more specific because output expectations are less uncertain than for the long run (see page 15). In the present section some questions of method and data are briefly reviewed concerning medium-term skill requirements of industrial development.

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[1] Striking differences in years of formal education distinguished skilled workers in different countries, e.g. the United States and Japan. It seems reasonable to conclude, in view of the size of these differences, that educational levels in high-income countries are the result, in part, of a demand for education as an income-elastic consumer good rather than as a prerequisite for accomplishing certain types of work. See United Nations, Centre for Industrial Development: *Skill Requirements in Manufacturing Industries*, document E/C.5/112/Add. 1, 23 Feb. 1966, p. 22 and Appendix III.

A common procedure of estimating these requirements consists of three steps[1]:

(i) statement of output expectations in the target year, for the economy as a whole, individual sectors and principal industries; this statement may be based on plans or on other sources of information (page 15);

(ii) estimates of total employment in the target year, again for the whole economy and for sectors and industries; these estimates are to be derived from the output expectations, using some target or forecast of future productivity;

(iii) specification of the employment estimates according to occupational groups which, at a later stage, can serve as the basis for estimating training requirements and setting targets for meeting these requirements; for present purposes it is this third step that is of major interest.

Although developed for long-term forecasting (because it is limited to problems of educational planning) the O.E.C.D. Mediterranean Regional Project is the best illustration of this approach. Its detailed method has been lucidly described and its results have been the object of penetrating analysis and evaluation.[2] Extensive reports are also available for each of the countries that participated in the project: Greece, Italy, Portugal, Spain, Turkey and Yugoslavia. The table below indicates the degree of detail used in the country studies (except for Portugal, where no subdivision by sector was made).

Country	Number of	
	Occupational groups	Sectors and industries
Greece	61	8
Italy	6	10
Spain	9	9
Turkey	4	5
Yugoslavia	8	15

In France and Hungary similar methods have been used for medium-term planning, and greater detail was therefore needed. Thus, in France 105 occupational groups and 41 economic sectors were distinguished.[3]

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[1] See J. Mouly: " Human Resources Planning as a Part of Economic Development Planning ", in *International Labour Review* (Geneva, I.L.O.), Vol. 92, No. 3, Sep. 1965, pp. 184-207.

[2] Herbert S. Parnes: *Assessing Educational Needs for Economic and Social Development* (Paris, O.E.C.D., 1962), and R. G. Hollister: *Technical Evaluation of the First Step of the Mediterranean Regional Project* (idem, 1966).

[3] For details see *Revue française du travail* (Paris, Ministry of Labour), Jan.-Mar. 1966, p. 98, and J. Timar: *Relations between Skilled Manpower Requirement and Educational Planning*, International Institute for Educational Planning document S.6/7.

In selecting and defining occupational groups the main criterion for present purposes is, of course, the structure of the education and training system for the development and adaptation of which targets are to be set and decisions taken. Thus, as the Mediterranean Regional Project was designed to help in long-term educational planning, its architect, Professor Parnes, divided the entire International Standard Classification of Occupations into four classes, each corresponding to an educational level. In France, in connection with medium-term planning, five levels of skill formation were distinguished for each of five fields of skill, thus giving 25 different classes. In Hungary, with three levels of training for each of 17 occupational categories, 51 classes were defined.

Once the units of the targets or forecasts have thus been defined, the estimation of actual numbers can begin. As in the case of long-term estimates (see page 19), the two basic methods are extrapolation of past national experience, and international comparison. While generally some blend of both approaches is used, extrapolation has been relied upon more heavily in France in the preparation of the Fifth Plan, and in the Mediterranean countries, except Spain. International comparison has been used primarily (and mostly for long-term purposes) in Puerto Rico, Spain, Thailand and the United Arab Republic.

In the procedure discussed in this section the theory underlying both international comparison and extrapolation is that a given level of productivity in a particular activity is associated with (and possibly " determines ") a specific occupational composition of the labour force. If a country expects or intends to attain a certain level of productivity in a certain industry, then it is assumed to need a labour force whose occupational composition resembles that of industries in other countries where that level of productivity has been reached. In the actual practice of development planning, " productivity " (e.g. in the sense of value added per man-year) does not really seem to have been a specific target for the development of individual industries. Yet it might well be useful for development plans to include such targets, and in any case a notion of what other countries have achieved in the way of productivity with their particular labour force will be of some interest to public policymakers deciding the scale and direction of development of their systems of skill formation and vocational guidance.

This assumption of a systematic relationship between productivity and occupational composition of the labour force was verified in the United Kingdom.[1] It was also closely examined in a study, more detailed and resting on a broader factual basis, undertaken at Northeastern University in the United States.[1]

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[1] LAYARD and SAIGAL, op. cit.

The latter study is of particular interest to medium-term problems because of the greater industry detail for which calculations were made (21 individual manufacturing industries in addition to manufacturing as a whole) than in the United Kingdom study. Its analytical results can be summed up by saying that " variations in the proportion of professional and technical workers are a major determinant of productivity in almost every industry; and that the importance of other groups varies from industry to industry, and depends on the type of curve that is used to fit the data. The only occupational group whose variations seem to exert no influence on productivity is that of clerical workers ".[2]

But the United States study is particularly valuable on account of the huge amount of factual manpower statistics presented by its authors. Data were collected from 19 countries, for seven of which statistics were available at two different dates, so that 26 sets of figures are presented. While the majority of countries covered are highly industrialised Western nations, the sample also includes Argentina, Chile, Israel and Japan (both 1950 and 1960), Puerto Rico and Yugoslavia. Data are given for 225 occupational groups derived from the framework of the International Standard Classification of Occupations, and for 58 industries or industry groups based on the United Nations International Standard Industrial Classification of All Economic Activities.

The O.E.C.D., London School of Economics and Political Science and Northeastern University experiments referred to above have all pointed to the lack of occupational data that could throw light on the skill requirements and other qualifications needed for normal performance in industrial occupations. Thus, occupational data provided by population censuses (the most important source of information on composition of the labour force) are usually based on the International Standard Classification of Occupations. But in its present form this classification does not distinguish clearly between different types and levels of skill requirements among and within occupations and occupational groups. This means that but limited conclusions can be derived from occupational data as to the educational and training requirements or attainments involved. The reason is that the International Standard Classification of Occupations was not designed for such purposes. Its main functions are to help to identify the contents of specific occupations in a national context (e.g. for vocational guidance and employment placement), to assist governments wishing to develop or revise national classifications of occupations (e.g. in connection with population censuses or labour force surveys) and to facilitate international comparisons of occupational statistics. To obtain classification by nature and level of occupational qualifications further criteria are needed—of the kind used in France (where " qualification/education profiles " of occupational groups have been developed) and in the United States (where a full classification is now available by " worker traits " [1]). There would seem to be a need for developing some such classification at the international level.

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[1] This study was first presented in *Skill Requirements in Manufacturing Industries*, op. cit. The full results were published in Morris A. HOROWITZ, Manuel ZYMELMAN and Irwin L. HERRNSTADT: *Manpower Requirements for Planning*, 2 vols. (Boston, Northeastern University, Department of Economics, 1966).

[2] Ibid., p. 33.

Short-Term Targets.

For present purposes the main difference between the short term and the medium and long term is twofold. First, expectations about the future are more specific—a typical short-term situation arises when plans and blueprints are being drawn up for the construction of a specific plant. Second, the scope for adjustment to expected needs is narrower—in the short run practically nothing can be done about general educational qualifications of the labour force, although something (perhaps a good deal) can be done in the way of vocational training and, of course, by hiring expatriate manpower.

When a plant is under construction or expansion, detailed occupational requirements are implied in the plans. The designers can usually provide fairly specific job descriptions, indicate the skill requirements that they think are needed, ways of acquiring these and time needed for this. For a structural steel plant for example, it could be established that a template-maker " makes full-size wood, cardboard, or sheet-metal templates from blueprints or models for use in laying out rivet holes, cuts and bends on structural steel: locates holes, cuts and bends, using his knowledge of trigonometry, orthographic projections and radial projections, and marks their locations, using such layout tools as squares, dividers and scales ". It might further be determined that in general such a worker, in addition to a certain general educational attainment, needs no less than two and no more than four years of training and basic experience, which he might acquire in another plant (in the same country or abroad) or in a school or training centre.

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[1] United States Department of Labor, Bureau of Employment Security: *Estimates of Worker Trait Requirements for 4,000 Jobs* (Washington, D.C., 1957), p. 114.

Information of this kind can be developed only in industry itself, and it is indeed in industry and the individual enterprise that it is primarily needed. Central public concern with foreseeing such short-term skill requirements would seem to be limited to two aspects: first, to ensure that manpower problems receive timely attention when plans are being established so as to minimise delays and losses due to unforeseen lack of skills once expensive buildings and machines have been installed; second, the central authorities may wish to see to it that in considering these manpower aspects use is made of a wide range of information on different possibilities, so as to avoid, for instance, the risk that unrealistically high or unduly low skill demands are made, that provision is made for expatriate manpower where local staff could have been trained, or that machines are installed for work that in a developing country is more appropriately performed by human labour.

It would indeed seem very useful for information on the manpower requirements of specific production processes to be much more widely available than is the case at present. This would enable developing countries, working out short-term plans, to choose from alternative possibilities those that are best suited to their own conditions—as regards manpower as well as other factors determining optimal production techniques.

Important sources of data for such purposes are engineers' blueprints—project feasibility studies and technical assistance reports drawn up by consulting firms for new plants—and the actual staffing of existing enterprises. Much of this information is of a private and often confidential nature, but some is freely available and has been published at the international level by the United Nations.[1] It tends to be in terms of occupational requirements rather than skill requirements, and the occupational categories distinguished are not always clearly defined or necessarily the same in different studies. Yet data of this kind can provide a very useful basis for determining short-term skill requirements, and considerable scope exists for international action in supplying such data.

Without going into technical details, it is suggested that such action could consist of the systematic collection of blueprint information for the use of developing countries seeking technical assistance in the expansion of their industries. The blueprints would of course be of much broader use than for the mere estimation of manpower requirements. But special attention could be given to the inclusion of clearly defined information on the manpower aspects. To be internationally useful it would of course be essential for such information to be based on clear and uniform definitions of occupational groups.

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[1] See, for instance, United Nations, Economic and Social Council: *Training of National Personnel for the Accelerated Industrialization of Developing Countries, Annexes (XXXVII) 12*, New York, Sep. 1965, Annex C (pp. 86 ff.); United Nations: *Managerial and Technical Personnel Requirements* (Cement Industry, Fertilizer Industry, Pulp and Paper Industries, Metal Processing Industries) (United Nations documents 65-06216, 65-06217, C.I.D./VI Background Papers Nos. 15 and 18).

Information of this highly specific nature quickly becomes obsolete. It is immediately and often quite drastically affected by technological change, much more so than more aggregated data are. An international service for the collection and dissemination of such information should therefore have available resources for keeping itself reasonably up to date.

MANPOWER REQUIREMENTS OF SPECIFIC INDUSTRIES

In this section the question is discussed of what is actually known about the manpower requirements of some of the proposals for industrial expansion made by the Regional Symposia. The question is of interest in its own right. Do these proposals seem at all feasible from the manpower point of view? Are the manpower problems involved in some of the proposals markedly more difficult than those of others? But in addition an examination of this question can illustrate in more concrete terms some of the general problems of manpower planning discussed in the previous section of this paper.

In the reports of the Regional Symposia special importance was attached to the development of the fertiliser, cement, iron and steel, and textiles industries, and of the metal trades. The data presented below therefore relate in part to these industries.

The proposals of the Regional Symposia relate to the medium or long term; some involve production targets for 1970, others for 1975 or later. But the proposals have in common that more or less precise output targets are put forward for fairly specific products or industries.

The data presented below are of three kinds. First, a very simple classification is given of over-all skill requirements in certain manufacturing industries according to experience in the United States. This information may throw some light on the relative size of skill formation problems arising in the development of one industry as compared with another. Next, some more detailed data are given regarding occupational requirements of certain manufacturing processes according to present-day technology. Third, some figures are put forward relating to the skill requirements of some of the occupational groups that seem of major importance in the development of various manufacturing industries.

Relative Skill Requirements of Manufacturing Industries

For the United States a unique, even if admittedly quite imperfect, statement exists of skill requirements of the labour force employed at certain census dates in well over 100 industrial sectors.[1]

The measure of skill requirements used is years of schooling as far as requirements of general education are concerned, and length of training (whether vocational education in schools, apprenticeships, on-the-job training or acquisition of essential experience) as regards specific vocational preparation. Estimates of these required periods were based on what was needed " for a worker to acquire the knowledge and abilities necessary for average performance in a particular job-worker situation " in a large number of jobs, in the view of experienced labour placement specialists in the United States during the early 1950s.[2] This information on skill requirements in specific jobs was applied to employment data, by occupation and industry, provided by the United States population censuses of 1940 and 1950. In this way a survey could be made of the distribution of the labour force in individual industries, according to seven periods of required general education and eight periods of specific vocational preparation.

Table II below is based on these data as relating to the 1950 census. It ranks a few industries that were the object of recommendations by the Regional Symposia in order of increasing average learning time required (general education and specific vocational preparation combined) for the labour force of each industry as a whole. The table further shows for each industry weighted average education and training times needed as a percentage of those in textiles.[3] While it can certainly not be assumed that developing countries " need " the same length of training time per man in their industries as did the United States in the early 1950s, it may be much less seriously wrong to assume that if the labour force in some specific industry in the United States needed a markedly longer (or shorter) average period of training than in other industries, that industry would also need relatively long (or short) training in developing countries.

The above figures suggest that among the industries listed " logging, etc. " is least exacting, and " construction " most exacting in terms of training time per man. The most demanding industry but one is non-electrical machinery, and the least demanding but one is glass making.

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[1] R. S. Eckaus: " Economic Criteria for Education and Training ", in *Review of Economics and Statistics*, May 1964, pp. 191 ff.; see also comments by David F. Ross and reply by R. S. Eckaus in ibid., Feb. 1966, pp. 103 ff.

[2] *Estimates of Worker Trait Requirements for 4,000 Jobs*, op. cit., p. 110.

[3] The absolute figures for textiles in the original source are 9.93 years of general education and 0.94 year of specific vocational preparation.

TABLE II. EDUCATION AND TRAINING REQUIREMENTS IN SELECTED KEY INDUSTRIES AS A PERCENTAGE OF THAT REQUIRED IN TEXTILES, UNITED STATES, 1950

Industry	General educational development	Specific vocational preparation
Logging and wood products, except furniture	91	76
Glass and glass products	90	94
Cement	97	112
Pulp and paper	100	87
Apparel	102	76
Textiles	**100**	**100**
Blast furnaces, rolling mills, etc.	101	131
Fabricated steel	106	134
Chemicals [1]	107	153
Electrical machinery	109	147
Non-electrical machinery	110	188
Construction	107	247

[1] This industry is included here in place of fertilisers, which featured prominently in the reports of the Regional Symposia.

While the figures may be helpful in indicating relative training time and cost per worker in different industries, they do not indicate relative cost of training per unit of production (e.g. $1 million of annual steel output). For that purpose one should also take account of the numbers of workers needed or, alternatively, of output per worker.

Thus, for example, value added per man-year in the United States is nearly twice as high in the pulp and paper industries as it is in the textiles industry.[1] Therefore, although general educational development and specific vocational preparation per man in these industries are about the same, per unit of output value they are only 53 and 54 per cent. respectively in pulp and paper of the requirements in textiles. For chemicals, the contrast is even greater: though training requirements per man in that industry are much greater than in textiles, general education required per unit of output is only 35 per cent. and specific vocational preparation only 50 per cent. of those in textiles.

In a sense the full information available for the United States could be of far greater and more specific importance to the planning of education and training in developing countries because that information is not limited to average relative figures as given in the table. It also shows the distribution of the labour force in each industry according to seven levels of required general education and eight levels of required specific vocational preparation. But as absolute figures on required training time in the United States in the early 1950s cannot be of great immediate relevance to developing countries during the late 1960s no further details are shown here.

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[1] Data from the United States *Census of Manufactures, 1958.*

Three further points of general interest may be noted in connection with the United States data. First, comparison of training time requirements of the labour force as shown in successive occupational surveys reveals the existence of trends which can help in making projections as a basis of planning. Table III below illustrates this point for shifts, between the 1940 and 1950 censuses, in the composition of the United States labour force as a whole, according to the eight categories of specific vocational preparation.

The second point worth noting is that the increase in training requirements between 1940 and 1950 revealed by these figures was due entirely to increases in the proportions of occupations requiring relatively longer training. It does not reflect increases in training requirements of the occupations themselves; the same " catalogue " of skill requirements was applied to the labour force data of both 1940 and 1950.

TABLE III. DISTRIBUTION OF SPECIFIC VOCATIONAL TRAINING REQUIREMENTS FOR THE UNITED STATES LABOUR FORCE IN 1940 AND 1950

(Percentages)

Specific vocational preparation range	1940 labour force	1950 labour force
Short demonstration only	1.44	0.47
Anything beyond short demonstration up to and including 30 days	16.70	20.95
Over 30 days up to and including 3 months	13.23	7.71
Over 3 months up to and including 6 months	22.90	23.71
Over 6 months up to and including 1 year	4.33	5.06
Over 1 year up to and including 2 years . .	17.54	14.37
Over 2 years up to and including 4 years .	20.53	23.52
Over 4 years	3.33	4.21
Total . . .	100.00	100.00
Average years of training required	*1.26*	*1.35*

Source: ECKAUS: " Economic Criteria for Education and Training ", op. cit., p. 186.

Third, it is of interest that the United States study suggested (but the data would not permit of any stronger term) the existence of some discrepancy between general educational attainments of the labour force and general educational needs according to this particular application of " the manpower approach " to education. Thus, in 1940, 31.2 per cent. of the labour force had actually had " full high-school education " but only 28.5 per cent. needed it for their work; by 1950 these figures had risen to 39.0 and 32.4 per cent. respectively. As regards college education (four years or more), in 1940 only 5.9 per cent. of the labour force had had such education while 7.1 per cent. would have needed it for their work; by 1950 needs and actual attainments in this respect had balanced at 7.4 per cent.

Occupational Requirements of Selected Manufacturing Industries

Some of the figures presented above indicate differences in average training time requirements as between industries. Such data may be of some general help in the fixing of medium-term and long-term targets of skill formation, to the extent that these can be linked to expectations (in plans or otherwise) about the growth of certain industries.

In the following pages more specific figures are presented concerning occupational requirements for some of the key industries whose expansion was recommended by the Regional Symposia. The data may illustrate the use of " blueprint information ", whose systematic collection and dissemination at international level was suggested above (see pages 26 and 27). The use made of this information below is somewhat hazardous. It is to estimate orders of magnitude of manpower required in certain broad skill categories if the output recommendations of the Regional Symposia are to be implemented. It should be stressed that the quality of the data, especially their comparability, is extremely limited. So the figures cannot be regarded as meaningful forecasts or targets. The conclusions drawn at the end of this section are much more limited—and even they may be contested. But in spite of these shortcomings this type of data is thought to be of sufficient general interest to warrant presentation of a small sample of what exists.

(a) *Fertilisers.*

A summary table of " blueprint " information concerning fertiliser plants (table IV) is given below.

The data are most heterogeneous, the plants compared differing in fuels and raw material input, product output, size and geographical location. Thus, the table illustrates the tremendous variation in manpower requirements even within one rather narrowly defined industry. However, it also suggests that these variations are largest by far for the category of unskilled workers (input per 1,000 tons capacity in plant 5 being 100 times as large as in plant 7), much smaller for skilled workers (plant 5 needing nine times as many as plant 1) and smaller still for " technical workers " (input in plant 5 being seven times that in plants 1 or 7). So the variation is least large for the group for which skill formation matters most. Furthermore, plant 5, the one most greedy of manpower, is also the smallest by far. If it is deleted from the comparison the ratios between highest and lowest manpower input are reduced to 47:1 for unskilled workers, 3.5:1 for skilled workers and 5:1 for technical workers.

TABLE IV. OCCUPATIONAL INPUT COEFFICIENTS IN THE FERTILISER INDUSTRY FOR 1,000 TONS/YEAR

Plant No.	Location	Fertiliser	Tons/year	Feed	Technical workers	Skilled workers	Unskilled workers	Total
1	India	Urea complex fertiliser	310 000	Naphtha	0.19	0.90	0.62	1.73
2	India	Urea nitro phosphate	310 000	Gas	0.72	3.04	2.81	6.57
3	India [1]	Ammonium sulphate	270 000	Coal	—	—	—	14.18
4	India	Urea	185 000	Naphtha	0.51	3.14	2.10	5.75
5	India	Urea ammonium phosphate	70 000	Naphtha	1.38	8.35	6.51	16.24
6	Burma	Urea ammonium phosphate	177 000	Gas	0.97	3.32	0.11	4.40
7	Latin America [1]	Ammonium sulphate	150 000	Crude oil	0.22	0.98	0.06	1.26

Source: Adapted from *Managerial and Technical Personnel Requirements: Fertilizer Industry*, United Nations document 65-06217, op. cit., table 2, p. 6.

[1] Existing plants where the coefficients represent actual staffing patterns. All other plant data are taken from feasibility studies and represent occupational inputs according to engineers designing new plants.

These are still very large differences. They seem to point to a rather wide variety of technological choice. From the point of view of manpower planning this would mean that, in this industry at any rate, manpower requirements differ widely according to the technology selected. Conversely and more importantly, there seems to be some considerable possibility of adapting technology to manpower availabilities—which is of interest for purposes of employment creation as well as of skill formation.

As noted in a study cited earlier, such a choice of technology appears to exist in a wide variety of industries. This finding would seem to strengthen the case, suggested above, for systematic collection and dissemination of information concerning staffing patterns of specific plants, but also regarding the occupational composition of industries found in different countries as a basis for manpower planning. " From such an array of data a developing nation could select one set . . . as its target for some future level of development." [1]

As an example of what is involved in drawing up and interpreting information on individual plants it may be of interest to refer to a relatively detailed manning table, drawn up by a United Nations mission in 1961 for what was considered the optimum type of fertiliser plant under Indian conditions of weather, social benefits, holidays, etc.[2] The table reflects not merely technological conditions of production but also principles of organisation and personnel management. Thus it is specified that the table makes no allowance " for extraordinary training of staff members except the over-staffing of providing an assistant for each responsible position ". But 20 per cent. extra manpower was allowed on all continuous shift jobs for relief for sickness, vacation and training. Again, the table does not provide for labour required during seasonal peaks. Furthermore, it applies to the fertiliser plant only, to the exclusion of administrative and policy-making functions of the enterprise.

Assuming that this plant were roughly appropriate, not only for India but also for Africa and Latin America, and assuming further that the increase in fertiliser output until 1975 recommended for these two regions by the Regional Symposia [3] were to be met entirely by plants of this type, what manpower requirements would this involve? The question is not entirely legitimate because it cannot be assumed that technology appropriate in 1961 will still be so in 1975. Furthermore, the model plant is for nitrogen fertiliser, whereas development of fertiliser industries will also have to include phosphoric and potassic products. Yet, a calculation of the kind made here may be of some interest in indicating an order of magnitude of possible manpower requirements of the development of a very important manufacturing industry in the developing countries.

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[1] HOROWITZ, ZYMELMAN and HERRNSTADT, op. cit., p. 4.

[2] The table appears as Fig. 1 on p. 89 of *Training of National Personnel for the Accelerated Industrialization of Developing Countries*, op. cit.

[3] The Regional Symposium for Asia did not set an output target for fertilisers.

The plant in question would have an annual capacity of 80,000 tons, using naphtha as feed stock. According to the report on the African Regional Symposium capacity in the fertiliser industry would have to increase between 1965 and 1975 by 3.6 million tons. The report on the Latin American Regional Symposium contains a forecast that consumption of fertiliser would rise from 1965 to 1975 by between 1.4 and 3 million tons; it is assumed below that this increase would be met by the region's own production.

Dividing the various groups of personnel specified in the manning table for the Indian model plant into eight broad groups of workers, and then applying the resulting figures to the recommended increases in fertiliser capacity, the figures given in table V are obtained.

TABLE V. MANPOWER REQUIREMENTS IN FERTILISER INDUSTRY, 1965-75

Occupational group	Africa	Latin America	
		Low estimate	High estimate
Managers and supervisors . .	1 100	400	900
Health personnel	300	100	200
Secretaries and clerks	1 500	600	1 300
Engineers and chemists . . .	1 300	500	1 000
Draughtsmen	100	50	100
Skilled workers, foremen . .	4 700	1 800	3 900
Operators	6 000	2 300	4 900
Labourers, guards, etc. . . .	11 500	4 400	9 400
Total . . .	26 500	10 150	21 700

The precise meaning of these figures is, of course, somewhat uncertain, since no exact definitions are available of the occupational categories in terms that could be compared with I.S.C.O. or with any specific national classification of occupations. Furthermore, as already noted, the output mix of the model plant is more limited than will be the future production of fertilisers in the developing world; the actual output mix will involve different occupational patterns.

An alternative estimate of occupational requirements was, therefore, made, using the occupational data in table IV, and weighting the occupational categories according to the output capacity of the different plants mentioned in that table. The results are given in table VI.

TABLE VI. ADDITIONAL MANPOWER REQUIREMENTS: ESTIMATES FOR 1965-75

Occupational group	Africa	Latin America	
		Low estimates	High estimates
Technical workers	2 000	800	1 700
Skilled workers	9 400	3 600	7 800
Unskilled workers	5 800	2 300	4 800
Total . . .	17 200	6 700	14 300

The two projections differ considerably, in particular as regards skilled workers:

	Africa	Latin America	
		Low estimates	High estimates
First projection	4 700	1 800	3 900
Second projection	9 400	3 600	7 800

These differences illustrate the weak basis on which the coefficients have been calculated. We are not even in a position to state that the manpower requirements are most likely to be somewhere between the minimum and the maximum estimate. Since we do not want to underestimate the burden that will be placed on the educational and training systems we retain the high projection, i.e. the first one.

(b) *Cement.*

Another key industry considered by the Regional Symposia for which a good notion of available technology exists is cement. Once again, though, only two Regional Symposia made estimates for output expansion. Theoretical manpower requirements are calculated below, using as a basis summaries of staffing needs in two large-scale plants in which unit capital costs are relatively low.[1] These plants are of 335,000 and 400,000 tons capacity; in the former the so-called " wet process " is used; in the other a " dry process ".

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[1] For a description of these plants see United Nations: *Studies in the Economics of Industry, No. 1: Cement,* document ST/ECA/75, p. 21.

Asian demand is expected (and output here assumed) to grow by 44.5 million tons from 1964 to 1970; African output by 2.9 million tons from 1964 to 1975. Should these output levels be reached by either of the two plants cited, estimated additional manpower needs for six occupational groups are shown in table VII.

TABLE VII. ADDITIONAL MANPOWER REQUIREMENTS IN THE CEMENT INDUSTRY: ESTIMATES FOR 1965-75

Occupational group	Asia		Africa	
	Plant I: wet process	Plant II: dry process	Plant I: wet process	Plant II: dry process
Quarry workers	4 400	3 700	200	200
Production workers	57 800	48 200	2 300	1 900
Laboratory workers . . .	5 200	4 400	200	200
Technical workers	3 000	2 200	100	100
Administrative workers . .	6 700	5 200	300	200
Guards and miscellaneous .	8 900	13 300	300	500
Total . . .	86 000	77 000	3 400	3 100

Without any doubt the occupational coefficients and hence the estimated manpower requirements are more reliable for the cement industry than for the fertiliser industry, the reason being the more homogeneous output in the former (see table VIII).

TABLE VIII. POSSIBLE CAPITAL/LABOUR SUBSTITUTION IN CEMENT: EFFECTS ON THE SKILL STRUCTURE OF THE LABOUR FORCE

Total capital outlays required (calculated in millions of dollars in 1960):

Asia:	Plant I	1 488	*Africa:*	Plant I	98
	Plant II	1 558		Plant II	103

Change from plant I to plant II in :	Per cent.
Capital outlays	+ 4.7
Employment [1]	−10
Quarry workers	−14
Production workers	−16
Laboratory workers	−15
Technical workers	−30
Administrative workers	−18
Guards and miscellaneous	+50

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[1] Based on more detailed estimates than those shown in the previous table.

Thus, although plants I and II have very similar fixed investment costs per ton of capacity ($33.4 and $34.8), their manpower inputs are substantially different. A small increase in fixed investment expenditures from plant I to plant II implies much larger reductions in the input of skilled—and especially technical—personnel. The choice between these two types of plant should depend on judgments about which of the scarce resources (capital or highly trained labour) provides the binding constraint, or could be better employed elsewhere.

However, a further consideration is that developing countries that establish new cement industries will find the wet process (plant I) preferable to the dry process in so far as the former is simpler to operate and uniform quality can be maintained more easily. Moreover, fuel costs on the dry process are higher than those on the wet process.

(c) *Other Industries.*

Following the general method described above for the fertiliser and cement industries, the I.L.O. has made very rough estimates of occupational requirements in the iron and steel, textiles and pulp and paper industries. These estimates are subject to the same types of limitations stressed in the case of fertilisers and cement. For this reason, as well as for reasons of time and of data problems, no attempt was made to calculate similar figures for some of the other industries on which recommendations were made by the Regional Symposia—machine tools for Latin America; oils and fats, glass, and forest products for Asia.

It would also have been of great interest to compare the calculations with the results that could be obtained using the wealth of data contained in the Northeastern University study referred to above.[1] That study includes detailed occupational statistics for, *inter alia*, the chemical, iron and steel, textiles, paper and paper products, machinery, food and beverages, and glass industries. But the study was not available in time for detailed examination in connection with the present paper.

(d) *Summary.*

Again, for purely illustrative purposes, however, the figures obtained by the I.L.O. calculations are summarised in table IX, which shows for each region the total calculated manpower requirements of the industries concerned, and their division between professional and technical manpower on the one hand, and workers (in some cases skilled workers only) on the other.

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[1] See pp. 23-24.

TABLE IX. OCCUPATIONAL REQUIREMENTS BY INDUSTRY AND REGIONS

(Rounded estimates for 1965-75 (in thousands))

Region	Industries	Total	Professional, technical, engineers	Skilled workers [1]
Africa	Fertiliser	26.5	2.5	4.7
	Cement [2]	3.1-3.4	0.5-0.6	2.1-2.5
	Iron and steel [3]	10.9-63.3	1.8-13.1	6.6-24.0
	Textiles	214.3	14.6	178.3
	Pulp and paper [4] . . .	41.8	7.4	30.3
	Total . . .	*300-350*	*27-39*	*222-240*
Asia	Fertiliser	N.A.	N.A.	N.A.
	Cement [2]	77.0-86.0	11.8-14.9	51.9-62.2
	Iron and steel [3]	14.9-87.4	2.4-18.0	9.1-33.2
	Textiles [5]	314.0-474.0	21.6-32.6	261.2-394.1
	Pulp and paper	463.0	140.4	322.6
	Total . . .	*850-1 100*	*175-200*	*650-800*
Latin America	Fertiliser [6]	10.2-21.7	1.0-2.0	1.8-3.9
	Cement	N.A.	N.A.	N.A.
	Iron and steel [3]	54.1-314.3	8.9-64.8	32.7-119.4
	Textiles	548.6	37.9	456.0
		N.A.	N.A.	N.A.
	Total . . .	*600-900*	*50-100*	*500-580*

[1] Including semi-skilled workers in textiles and iron and steel. [2] Wet process (high projection) and dry process (low projection). [3] Highest and lowest estimates from among five different occupational patterns. [4] Excluding North Africa. [5] The ranges are due to two assumptions as to likely consumption (3,700 and 5,600 million square yards). [6] High and low assumptions as to likely output.

N.A. = figures not available.

The figures are subject to a number of limitations, including the following:

(a) Where manpower requirements had to be based on demand projections it was assumed that demand will be entirely satisfied by production in the region concerned.

(b) The definition of output in global projections is not the same as the definition of output at the plant level. Projection of final demand relates to an economic sector or a branch of industry: iron and steel, cement, etc., whereas output mix of a plant forms only a part of total sector or industry output mix; i.e. to a certain extent we compare units which cannot be readily compared, the sector and the enterprise, the total and the specific. With the exception of cement, the final products are too heterogeneous to warrant projection on the basis of occupational coefficients for one or a few plants.

(c) The occupational coefficients do not reflect the considerable variation depending on size of plant (except for cement).

(d) The occupational classifications in the data used for making the projections are neither uniform nor consistent. This is one explanation for the sometimes tremendous variations in the projections.

In spite of these and other shortcomings, it would seem that from this very limited table at least two conclusions may be drawn. First, it is quite evident that the total employment-creating capacity of the industries concerned is but a minute fraction of the expected increases in the total labour force of the regions concerned.

Recently, estimates were made in the I.L.O.[1] of future increases in the world industrial labour force. In table X these estimates are compared for the period 1965-75, with the maximum estimates of total new employment calculated for the key industries considered above.

TABLE X. ESTIMATED INCREASE IN THE LABOUR FORCE AND IN EMPLOYMENT IN KEY INDUSTRIES, 1965-75

(In thousands)

Region	Labour force	Employment in key industries
Africa	28 100	350
Asia	150 600	1 110
Latin America	25 100	880
Total	203 800	2 340
Percentage	100	1.15

Of course, increases in manufacturing output indirectly give rise to greater output and employment in related activities (transport, sales, raw materials, etc.). And in any case many industries will grow independently from the expansion in the key industries considered in the present paper. Furthermore, not all countries are included in the regional production and employment estimates for key industries given in table IX. But it is clear that even if these factors were to cause the estimates of employment in the key industries to be multiplied by, say, five or ten, only a small proportion of the increase in the total labour force would be absorbed.

The second conclusion that one would like to draw from the figures in the table is that the requirements for skilled manpower which it indicates do not seem forbiddingly high. Evidence for judging this question is almost non-existent. In particular, it is not possible to compare the figures with indicators of what is obviously the most relevant factor—i.e. the current and probable future capacity of the region to train personnel of the various categories involved. Some estimates exist, however, of future total skilled manpower requirements in the developing regions. It may be of interest to compare these with the very partial estimates of the table, to see whether the latter are at all compatible with the former.

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[1] James N. YPSILANTIS: *World and Regional Estimates and Projections of Labour Force*, United Nations document ISLEP/A/VII.4.

The first of these estimates can be found in an I.L.O. study submitted to the 1966 United Nations Seminar on Long-Term Projections.[1] In that study projections were made of future demand for labour in each of the major groups of the International Standard Classification of Occupations, assuming reasonable rates of economic growth. The projections were based on statistical analysis of employment in these groups on the one hand, and level of economic development, rates of growth and size of countries on the other. Taking the projected increase in employment during 1965-75 for the major group " professional, technical and related workers " as the indicator of growth in total demand for high-level personnel, and the increase for the major group " craftsmen, production process workers and labourers not elsewhere classified " as the indicator for skilled workers, table XI can be drawn up.

A second estimate of future high-level manpower needs appears in a report submitted in 1964 to the Economic and Social Council.[2] Here, increased numbers of engineers, scientists and technicians required for industrialisation in general were estimated for the period 1960-75. For the period 1965-75 these estimates may be assumed to be somewhat larger than two-thirds of those for the 15-year period. This would mean increased needs in the three occupations mentioned of approximately 70,000 in Africa, 400,000 in Asia and 250,000 in Latin America.

For what they are worth, these figures suggest that the high-level manpower requirements of the key industries considered in this paper would not be excessive compared with global estimates of future manpower requirements in the developing regions. Indeed, in some cases the key industries would seem to require relatively small fractions of the total estimates; global estimates themselves might be grossly unrealistic. It might be fair, however, to conclude that the skill requirements in the key industries cannot yet be seen to be alarming.

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[1] SCOVILLE, op. cit., Part *(b)*, pp. 38-40.

[2] *Training of National Personnel for the Accelerated Industrialization of Developing Countries*, op. cit., pp. 24-25.

TABLE XI. INCREASES IN DEMAND FOR HIGH-LEVEL PERSONNEL AND SKILLED WORKERS, 1965-75

(In thousands)

Region	High-level personnel		Skilled workers	
	Total	Key industries	Total	Key industries
Africa	1 500	40	6 100	240
Asia	6 700	210	35 600	810
Latin America . . .	1 800	105	9 000	580

Skill Requirements for Industrial Occupations

To establish occupational requirements for industrialisation is a first step in target-setting for human resources development. The second necessary step consists in determining the skill requirements involved, so that measures can be taken for providing the skills. But for various reasons methods and information regarding this second step are less satisfactory than those concerning the first. Skills have been, and perhaps can only be, defined and classified in much less precise terms than occupations. Furthermore, many skills can be acquired in several ways—in different types of schools, by different methods of training in employment, or in various combinations of the two. Practice varies widely in this respect both within and among countries, so that for many occupations, even when skill requirements have been defined, it cannot be said that there is one particular path of skill acquisition.

One result of these circumstances is that the possibility of planning on the basis of international comparison is more limited as regards skill requirements than it is in assessing occupational requirements. But in practice the scope for international comparison is even far smaller owing to three further factors. First, few countries collect systematic information on training in employment, and while many collect data about formal education of their labour force, they do so by very different criteria that may be impossible to compare (e.g. classification by different periods of school attendance, age of school leaving, highest level of school completed).[1] Second, although it should not be impossible to reach a measure of international agreement and comparability on this particular point, further difficulties arise from wide international differences in the organisation, methods and effectiveness of training and education. Hence, even if all countries provided comparable data on, say, years of general education and training in employment, this would by no means imply that a comparable measure of skill had been provided. Third, to the extent that comparisons can be made of educational attainment in given occupational groups as between different countries, these are likely to indicate primarily the levels of general education that countries can afford rather than the minimum education that is needed for effective, normal or efficient performance of jobs.

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[1] For a clear discussion of the problems involved see LAYARD and SAIGAL, op. cit. Also HOROWITZ, ZYMELMAN and HERRNSTADT, op. cit., Vol. I, p. 20, and Vol. II, pp. 158 ff., where occupational data are classified according to years of schooling.

For all these reasons the present scope for international comparison in determining skill requirements of given occupational patterns is quite limited; yet it would seem desirable to take international action for increasing this scope. There can be no doubt that if each of the above difficulties were carefully examined at the international level, not only could ways be found of overcoming them but, once comparable data existed, many ways could also be discovered of improving national practices in education and training.

Meanwhile, countries have to rely largely on their own experience and judgment in determining skill requirements by occupation or occupational group. Relatively little systematic work has been done in this field, but two interesting examples may be mentioned here.

The first is an inquiry made in July 1966 among Nigerian employers in a sample of 124 private and public enterprises [1], employing ten or more workers each, outside the agricultural and services sectors, mostly in Lagos. The occupations examined included senior positions (engineers and other professionals, administrators), two groups of medium-level occupations (junior administrative/supervisory/foremen, and technicians), occupations at the skilled and semi-skilled level, and unskilled occupations. The data concern 125 occupations listed in the International Standard Classification of Occupations (in which 65,000 workers were engaged in the enterprises covered), five-digit occupations at the senior level, three-digit groups of occupations at the other levels. Employers were asked what educational qualifications they would require when recruiting new employees, and what special training in employment (apprenticeship, on-the-job or in-service training) and experience they thought necessary for efficient performance in the jobs concerned.[2] In addition, they were asked what qualifications their labour force actually possessed, what difficulties existed in recruiting personnel with the desired qualifications, and what wages and salaries were paid.

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[1] National Manpower Board (Nigeria): *Survey of Educational and Training Content of Occupations* (Lagos, 1966).

[2] In the study, training in employment is called " employer training ".

It is impossible to summarise here the detailed method and rich contents of this survey, which should be of great interest to every developing country. But a few salient points may illustrate the results obtained:

(a) Seven out of ten jobs above the unskilled level, three out of four at the medium level, and more than one in two at the senior level called for training in employment, in addition to formal education; of jobs requiring secondary technical education more than three-quarters also required training in employment.

(b) In the senior group, engineering jobs required the most advanced formal studies, but 60 per cent. also needed training in employment; for the senior group as a whole, and in mining, manufacturing, construction and utilities, 30 per cent. or more of these positions called for more than two years' training, mostly on the job.

(c) Senior administrative positions called for experience, typically during more than three or even five years; indeed, for this group " employer responses indicate a willingness to accept experience as a substitute for part of education and/or training qualifications ".[1]

(d) The highest proportion of jobs requiring training in employment —76.1 per cent.—occurred at the medium level; but the proportion was higher for the junior administrative/supervisory/foremen category than for the technicians; in manufacturing the required training was estimated at two or more years for 30 per cent. of the positions in medium-sized enterprises and at three or more years for about the same proportion in large enterprises.

(e) In almost half of the jobs at the skilled or semi-skilled level no post-primary education was needed, but in nearly 70 per cent. training in employment was required; clerical and sales jobs required least training; production jobs and occupations in transport and communications required most training.

(f) Salary levels rose clearly with educational level required, so that employers could reduce wage and salary costs by providing their own specialised training in so far as this replaced specialised pre-employment training.

The second example of determination of skill requirements for given occupations is taken from the United States. In that country jobs have been classified in groups that make similar demands on workers (worker traits) in terms of training time as well as aptitudes, interests, temperament and physical effort. The classification is based on elaborate data collected by employment service specialists, from business organisations, trade associations, professional societies and government agencies. Worker traits are specified for 22 broad areas of work, including clerical work, crafts, education and training, engineering, machine work, managerial and supervisory work (as well as art, writing and other non-industrial activities).[1] Within these areas of work a total of 114 more detailed " worker trait groups " are distinguished, e.g. (within the area of machine work), set-up and/or all-round machine operating, set-up and adjustment, operating-control, driving-operating and tending. The specific worker traits required within each group of occupations are stated in a " qualifications profile ". In the case of the group " set-up and machine operating " this profile indicates under skill requirements a general education level 4 and a range of specific vocational preparation levels 6 to 8. The profiles also give indicators of aptitudes and other traits required, and of common channels of entry into the group of occupations concerned—e.g. through on-the-job training and/or various types of schools.

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[1] *Survey of Educational and Training Content of Occupations*, op. cit., p. 17.

Each worker trait group lists a number of specific occupations: thus, the group " set-up and machine operatives " includes a number of jobs in the nature of tool-making and related work. Unlike the 4,000 jobs in the analysis mentioned earlier (where the tool-maker is marked as needing level 8 of specific vocational preparation—more than four years) the individual jobs within worker trait groups are not separately assigned figures concerning training and other requirements. Nevertheless, this classification provides a relatively detailed specification of skill requirements. This classification of jobs by worker traits may indicate the way out of the difficulties that have been encountered in the use of the I.L.O. International Standard Classification of Occupations—namely that no definition can be made according to levels of difficulty and skill within many occupations.

Some Conclusions and Recommendations

This final section lists some of the salient points that emerge from the discussion in the preceding chapters. In addition, some suggestions and recommendations are made on types of manpower information the systematic collection and development of which would seem indispensable for the target-setting approach to human resources planning in industry, and on organisational aspects of this approach at both the national and international levels.

The following major points seem to arise from the above analysis:

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[1] United States Department of Labor, Bureau of Employment Security: *Dictionary of Occupational Titles*, Vol. II, Third Edition (Washington, D.C., 1965), pp. 214-530.

(a) The target-setting approach to human resources planning is an important condition for the industrialisation efforts of developing countries to become a vehicle for progress rather than a further burden on communities that are already very poor.

(b) While the specific skill requirements for the development of industry should be studied in considerable detail, targets for meeting them should be set with due regard to the manpower problems of other sectors.

(c) Where over-all plans for industrial development exist, manpower planning should be made part of them; where no over-all development plan exists, manpower planning should nevertheless be undertaken on the basis of other indicators of probable future economic development.

(d) In studying industrial skill requirements and setting targets for meeting them, major emphasis should be given to training in employment —i.e. largely, but not exclusively, training on the job.

(e) Targets should guide not only the provision of facilities for skill formation but also measures to influence the utilisation of such facilities (e.g. vocational guidance, wage and salary policy).

(f) Targets should be set separately for the short, medium and long term.

(g) International comparison and exchange of experience are important aids to determining manpower requirements and to setting targets for meeting them. It is highly desirable—

(i) to develop among countries a common approach, and common definitions, regarding types and levels of industrial skills as related to occupational categories;

(ii) to arrange for the systematic collection and dissemination of industrial manpower information at the international level, including information on staffing patterns of model plants; arrangements should be made for keeping such information up to date.

(h) In determining skill requirements account should be taken of occupations in the field of industrial research and development in addition to occupations in production, transport and trade.

(i) From the point of view of skill requirements the proposals made by the Regional Symposia for expansion of key manufacturing industries do not seem to be unrealistic.

Tools of Manpower Planning for Industry

The data presented above are perhaps too few to be regarded as a truly representative sample of the work that remains to be done in developing countries to specify the skill requirements of industries that it has been contemplated—in national plans and at international gatherings such as the Regional Symposia—to establish and expand. Yet it may be said with confidence that very little systematic information is available on this point. It is, therefore, suggested that action should be taken to fill this gap.

More specifically, it is proposed that developing countries forge certain tools of manpower analysis that have proved feasible and useful elsewhere. Of course, these tools should be adapted to the specific needs and practical possibilities of the developing countries. Five such tools might be considered.

1. An occupational breakdown of the population census should be made or (where resources do not permit this) a sample inquiry showing numbers by individual industries. This information provides the basis of occupational projections in the country concerned adapted in the light of experience abroad. It also contributes to the international pool of knowledge about manpower problems, for other countries may learn from it as well.

2. A sample survey of the actual educational and vocational qualifications of workers in selected occupations in individual industries would supplement that mentioned in the preceding paragraph and would be of great help in connection with the three following suggestions. Although it would be desirable to have this information also collected in the framework of a census, this is far too complex a matter to be possible with the personnel and other resources available for census-taking in developing countries (or, for that matter, in advanced ones).

3. A system of vocational training statistics, covering both formal courses and on-the-job training arrangements, and showing what is being done in this field and, if possible, at what cost, would greatly facilitate any target-setting in the area of industrial training.[1]

4. A statement of general skill requirements (and possibly other worker traits) should be formulated—and revised from time to time—for selected areas of industrial work that are expected to grow in the coun-

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[1] It is typical of the traditional neglect of study of human resources as compared with trade, physical capital, etc., that such statistics are virtually non-existent even in advanced countries. Thus, in a recent impressive study of *Some Factors in Economic Growth in Europe during the 1950s* (Geneva, 1964), the United Nations Economic Commission for Europe could not include examination of vocational training as a factor in growth, finding it " statistically intractable " (p. V-22). The Industrial Training Boards in the United Kingdom to which reference is made later in the present study can require firms to keep records and to give information. This power could, presumably, be used to build statistics—at least on a sample basis.

tries concerned. The criterion of what was required might be found in the average performance of workers in industries capable of competing with the manufacturing industries of advanced countries. A statement of this kind would provide some general orientation for objectives (according to the manpower approach) as regards the nature and level of general education for those who were expected to find employment in various kinds of industrial work. It would also provide an orientation for vocational guidance work, and it could provide clues as to where public support (financial or otherwise) was most needed to stimulate the provision of training facilities.

5. Specific skill requirements (and possibly other worker traits) should be catalogued for a number of key occupations (perhaps from 100 to 150) in a limited number of key industries. Such a catalogue would be useful for the same purposes as those stated in the previous paragraph, but as it would be more detailed and precise it would also provide the basis for making specific training arrangements for the really crucial occupations in industry. About half of the catalogue might consist of such occupations as those (roughly 800) that are listed under Major Group 7/8 of the International Standard Classification of Occupations (craftsmen, production process workers and labourers not elsewhere classified) but many of which are unskilled or are of limited importance to key industries. The other half might include selected industrial occupations from Major Groups 0 (professional, technical and related workers), 1 (administrative, executive and managerial workers), 2 (clerical workers) and 6 (workers in transport and communication operations). The survey by the Nigerian National Manpower Board seems an excellent example of how the necessary data could be collected.

It would appear that, if this approach to some of the problems of setting targets for skill formation were to commend itself, there would be considerable scope for international action in organising it. There has, of course, already been a great deal of international action in preparing the 1970 censuses—a major opportunity for obtaining, improving and updating the information mentioned under the first of the five points above.

But there would also be scope for international action in preparing the four other tools suggested, mainly for two reasons. First, some of the work involved would be difficult and expensive; pooling knowledge and experience would reduce the costs and improve the quality of the results. Second, as international comparison has proved to be of great help in forecasting and judging manpower requirements, it is important that the data to be collected and the standards of skill requirements to be set are truly comparable as between countries.

At the same time it would seem unwise to organise such work on a world—or even on a continental—basis. To be useful for practical purposes the data and standards should be specific to the level and general nature of industrial and educational development, and possibly to some other characteristics of the countries concerned. Sufficient similarity on these points, enabling a common pattern of skill requirement to be set for key occupations, can probably be found among relatively small groups of countries in the same geographical region.

Without entering into technical detail it would seem that international organisations could contribute to such work, for instance in the following ways:

(a) convening experts from appropriate groups of countries for which it seems *a priori* possible to establish more or less common catalogues of occupational skill requirements; these experts would include persons concerned with education, training and manpower planning as well as employers and workers to the extent that among these groups people could be found with practical knowledge and insight;

(b) arranging for experience gained in the definition of areas of work and in the establishment of catalogues (e.g. the United States worker trait groups) to be brought to bear in developing countries;

(c) as a specially difficult and important part of the previous step, assisting in the translation of required types and levels of ability into terms of specific educational attainment through the school systems of the developing countries concerned[1];

(d) in general, promoting common approaches with a view to gaining maximum benefits from international exchange of experience; of particular importance in this connection is the adoption of uniform, or at least internationally comparable, definitions of occupations according to type and level of qualifications required (e.g. technician, skilled worker, etc.).

Some Organisational Questions

An attempt has been made in this paper to show that systematic study of skill requirements as a basis of target-setting is necessary to prevent waste in industrial development that low-income countries can ill afford—waste of expensive plant and equipment for want of qualified manpower, and waste of equally expensive training resources used in wrong directions, or following faulty methods, or not used at all for want of means to attract trainees. Suggestions were also made regarding four fields and three time spans for which targets of skill provision should be set, and the kinds of information needed for the purpose. In this concluding section the question is considered of who should do this work, and how.

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[1] This problem proved particularly difficult also in the United States. ECKAUS (" Economic Criteria for Education and Training ", op. cit., p. 185, note 12) reports having received " conflicting advice " on the matter and having found his own translation " controversial ".

It would seem best to look at this question separately for training in employment on the one hand, and more generally oriented education and training on the other. Decisions in these two spheres rest with different agencies: with industry itself (public or private or both) for the former, and with the government for the latter. Therefore, as already suggested earlier in this paper, while specific target-setting for general education and training activities are proper matters for central public concern, for training in employment this should in large part be the responsibility of industry itself.

Finally, a brief reference is made to manpower planning at the international level.

General Education and Training.

As noted in an earlier section, it is necessary to consider manpower requirements for any country as a whole—not for industry or any other sector in isolation. Otherwise, since skilled manpower can often move easily from one sector to another, targets set and attained for industry might eventually prove inadequate (or excessive) if people trained for industry moved in large numbers to sectors for which no adequate targets had been set (or vice versa).

There should, therefore, be some agency of central government to concern itself with the determination of a country's over-all skill requirements and with target-setting for meeting them.

It would further seem clear that such an agency ought to be knowledgeable about the demands made upon each of the major sources of skill provision and about the practical means and possibilities of meeting these demands. This could be achieved by including among the agency's membership or consultants representatives of—

(a) the government authority responsible for over-all economic and social development;

(b) industry;

(c) educational authorities;

(d) any authority that may exist with major responsibilities for the organisation and functioning of the labour market (e.g. an employment service).

The nature of the agency itself must, of course, depend on the system and organisation of national government in each country. For instance, it may be a committee of a national planning board, where such a body exists, or it might be attached to some suitable ministry or ministries (e.g. the ministry of labour, a ministry of manpower, or a ministry of education) where no national planning board exists. But many other variations are, of course, possible.

Training in Employment.

How can a country organise a target-setting approach to skill requirements in the industrial sector?

As noted in earlier sections of this paper, industry itself is best equipped both to specify its detailed requirements and to meet these through training in employment—i.e. largely by training on the job. It would, therefore, seem necessary for some body or bodies to be set up through which industry could perform these functions.

But it was also suggested above that there is considerable public interest in ensuring that industry adequately discharges its functions regarding skill formation. Training in general and basic skills tends to be inadequately provided by employers owing to the risk that employees will leave the enterprises which trained them. More generally, employers faced with the expense and difficulties of setting up training schemes may underrate the value of training to their own enterprises, blaming bad performance on their workers instead of on their own failure to train, and hoping that by offering a high wage they can entice workers from other enterprises which do provide training. Finally, organisations of skilled and professional workers may insist on unduly slow and expensive training schemes.

It would therefore seem necessary for any bodies concerned with training for industry also to include representatives of the public interest.

In view of these considerations, considerable interest attaches to the Industrial Training Boards set up under the British Industrial Training Act, 1964, which would seem to meet the requirements suggested above almost ideally.

These Boards provide the organisation for attaining the threefold objective of the Act, which is to ensure that—

(a) the quantity of training provided in an industry is adequate to meet the assessed training needs of the industry;

(b) the quality of this training reaches at least the minimum standards set for the industry;

(c) the cost of training to the employers is fairly shared among employers in an industry.

The composition and procedures of the Boards are rather similar to those of the wages councils that under varying names have for many years existed in the United Kingdom and several other countries (including developing countries such as Ceylon, India and Uruguay) for the purpose of statutory minimum wage fixing. Thus the Boards are appointed (one for each industry or appropriate group of industries) by the Minister of Labour, after consultations with employers' and workers' representatives in the industries concerned. They may make proposals for the Minister to issue a statutory order by which a levy is imposed on employers in the industry concerned. Their membership includes equal numbers of employers' and workers' representatives in addition to educational representatives and a chairman, who must have industrial or commercial experience. Representatives of the Ministry of Labour and of the Department of Education and Science attend meetings of the Board, but without the right to vote.

In addition, a Central Training Council has been set up to advise the Minister of Labour on the administration of the Act and on industrial training matters generally. This Council is also tripartite and includes a number of chairmen of Training Boards. It is expected to keep under review the performance of the Boards and to consider matters of general interest to them (e.g. training methods, training of training officers and instructors, use of proficiency tests, training of clerical and commercial staff).

Several interesting features of this system (such as technical guidance and assistance to be provided by the Boards in respect of training schemes, and the imposition of levies as a source of financing grants to enterprises that operate training systems) need no discussion here. It is sufficient to note the general organisation set up under the Act and the role it can play in assessing manpower needs in both individual firms and industries, and for certain occupations that are common to several industries. It is intended that the Boards should play such a role for all categories of employees—management and supervisory personnel, technologists and technicians, as well as skilled, semi-skilled and unskilled workers.[1] Assessment of training needs is to be made on the basis of job analysis in terms of the skills and knowledge required for a competent, continuous and confident performance and the compilation of a training syllabus for each job.

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[1] The Central Training Council has appointed a Management Training Committee, and the Engineering Industry Training Board has formed a Supervisory Training Policy Committee.

In conclusion, it is suggested that industrialising countries may find a system along the lines described above of the greatest use in setting targets for skill formation in industry, for developing the five tools of manpower planning proposed above and, of course, for the actual organisation and improvement of training schemes. But this last aspect will be examined further in paper No. 2.

International Manpower Planning.

It may be rational for industrialising countries to continue relying to some extent, for some time to come, on expatriate manpower, especially teachers and instructors. If so, it would seem necessary to arrange for some planning at the international level so as to ensure that the necessary manpower could indeed be made available by the countries expected to provide it.

This would mean an international application of the target-setting approach, at least for certain occupational groups that are important for industrialisation. It would require a forward look to be taken at probable needs in the industrialising countries and possible availabilities in advanced countries. A start has indeed been made with this approach. The Report of the Secretary-General to the Economic and Social Council quoted earlier[1] and, on a more modest scale, the present document have sought to throw some light on future needs in the industrialising countries. Some advanced countries have included in their assessments of future skill requirements some provision for assistance to other countries: e.g. France as regards secondary-school teachers and instructors for accelerated vocational training, and the Federal Republic of Germany and Sweden as regards vocational training instructors.

It is suggested that international organisations could usefully develop further the assessment of future needs and supplies with a view to concrete target-setting for technical co-operation. Such work would seem to fit eminently into the framework of the United Nations Development Decade and the decade following it.

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[1] *Training of National Personnel for the Accelerated Industrialization of Developing Countries*, op. cit.

2. EDUCATION AND TRAINING PROGRAMMES

This paper is very broad in scope. Education and training with a view to industrialisation imply the whole process by which the general and technical knowledge and the skills needed for industrial production are acquired and developed. By qualified personnel is meant any person who possesses some special skill or knowledge required at any stage, and at any level, in the industrial process: from the semi-skilled worker to the technician, the engineer and senior management.

The purpose of this paper is to define some of the conditions which must be fulfilled if countries in the process of industrialisation are to be endowed with an optimum " skill generation system "—optimum as regards both cost and efficacy. It examines problems raised by the creation or development of such a system, and suggests solutions for these problems in both general and specific terms.

The paper is divided into four sections. The first contains a brief description of the main problems. The second is concerned with determining an education and training strategy. The third section discusses some of the more important aspects of the implementation of education and training programmes, while the fourth makes some concrete proposals for international action in this field.

I. The Problems

Developing countries have made strenuous efforts to overcome their problems in the field of education and training. There have been some remarkable achievements—often at great cost—especially during the past ten years, but much remains to be done. In the following pages the difficulties are summarised which the developing countries themselves admit still have to be overcome. There are notable exceptions among those developing countries which have already attained a comparatively high level of industrialisation. But the broad lines drawn may serve to highlight underlying principles of national and international action which would be suitable for application in a great many cases.

Many of the education and training systems existing in the developing countries are unable to supply, at the right time and in sufficient number, the qualified persons needed for industrial development. Moreover, the education and training provided by these systems are a heavy financial burden. This situation prevails equally in both of the main sources of skill generation: the general education system, and the training system (whether in schools or in undertakings).

SHORTAGES OF QUALIFIED PERSONNEL

Almost all developing countries suffer from serious shortages of qualified personnel, at all levels and in all key posts in industry: plant managers and administrators; graduate engineers in design, production and research; technicians, workshop supervisors, pattern-makers, draughtsmen; foremen and supervisors, highly skilled production workers, office employees; repair and maintenance workers. These shortages exist, paradoxically, side by side with unemployment and massive underemployment—even in conjunction with alarming reductions in the level of industrial employment—and seriously hamper industrialisation plans and programmes in the short term. Even in the medium term, it seems in certain cases unlikely that they can be substantially reduced under present conditions. In some countries at early stages of industrialisation the output of skill generation systems will not even suffice to supply the qualified personnel needed for replacement purposes.

It is also true that in some countries there is an over-production of certain categories of staff. Thus in the Philippines, between 1963 and 1970, there is likely to be an estimated surplus of 15,000 graduate engineers.[1] Surpluses of trained personnel, just as much as shortages, point to one of the main characteristics of the education and training systems of the developing countries: they have rarely been set up with an eye to the countries' industrial development needs.

Even in those cases where there is an over-production of certain categories of qualified personnel, imbalances constitute a serious problem. In the United Arab Republic, where there appears to be too high a proportion of university graduates, there are serious shortages at the technician level, and these shortages will tend to become more acute unless vigorous action is taken to combat current trends.[2]

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[1] A. S. BHALLA: " Manpower and Economic Planning in the Philippines ", in *International Labour Review* (Geneva, I.L.O.), Vol. 94, No. 6, Dec. 1966.

[2] A study undertaken by the Institute of National Planning, Cairo, estimates that in 1970 the United Arab Republic will be faced with a shortage of 213,000 technicians, or 41.5 per cent. of estimated requirements. Figures for 1975 and 1980 show estimated shortfalls of 263,000 (43.1 per cent.) and 373,000 (47.7 per cent.) respectively. See *Manpower Planning in the United Arab Republic* (Cairo, Institute of National Planning, Nov. 1966).

QUALITY DEFICIENCIES

Frequently, trained persons have not acquired the qualifications needed for the jobs they will be holding in industry. Many examples exist of graduate engineers barely meeting the requirements of jobs at technician level. Although engineers are in fact often called upon to fill such jobs because of the shortage of competent technicians, such a substitution is rarely satisfactory: the skills and knowledge of the one occupation bear no relationship to those required of the other, and all too often a poor engineer simply becomes a poor technician. The reasons for such qualitative deficiencies lie in defects in the main sources of skills and qualifications for industrial employment, namely the general education system and the training system.

(a) *The General Education System*

Education has many objectives which are not necessarily linked to the goal of industrial development—e.g. providing a means of access to cultural riches, developing the personality of the individual. It also has, however, another basic aim: to prepare the individual for vocational and technical training. It is thus, in the context of this paper, the main stream of preparation for industrial employment. Often, however, the organisational structure, curricula and pedagogical methods of the educational system are inadequate and jeopardise the success of training provided later on.

Many countries, in pursuit of important social ideals, have heavily emphasised the expansion of primary education; but this quantitative effort has hampered any improvement in the quality of primary education, which in many instances is poor. At the same time it has held back, for sheer lack of resources, the improvement of secondary and higher education. As a result, those who have gone through the primary education system—many without completing it—will not be able while in employment to receive adequate further education, for lack of teachers, instructors and other qualified staff which the other, higher levels of education cannot provide. General secondary education suffers from well-known deficiencies: insufficient attention to the sciences, old-fashioned teaching methods, no relation to the realities of economic life, inadequately trained teaching staff. It all too frequently turns out people who have no desire to enter industrial employment later on or on whom industrial vocational training will be partly or wholly wasted.

(b) *The Training System*

(i) Skilled Workers.

Two main weaknesses characterise manpower training for this group: (1) persistent competition between or overlapping of different types of institutions or forms of training—i.e. vocational schools, trade schools and training centres on the one hand, and training provided in undertakings on the other; (2) the low quality and/or high cost of both forms of training. Generally speaking, vocational and trade schools are very expensive and their graduates are often not accepted by undertakings. Training centres turn out, at considerable cost, too few workers, or workers whose trade specialisations do not match the jobs available, or whose theoretical knowledge and practical skill leave much to be desired. Both the training centres and the vocational and trade schools are handicapped by having inadequately trained teachers, curricula which are too theoretical, too general and often of poor quality, and equipment that is out of date or inappropriate to the instruction given. Furthermore, both types of institution suffer from inadequate links with industry, or even from a total lack of them.

To meet acute shortages of skilled manpower required for specific industrial projects, recourse is frequently had to accelerated training centres for adults. Such centres can train persons for specific needs within the space of a few months, but they are expensive to set up and run. Moreover, the skills taught are narrow and the centres are not flexible enough to adapt to changing needs.

Training in undertakings—whether given informally or under a formal apprenticeship scheme—also has well-known defects. Even when it is organised systematically it is often too narrow in scope, dividing the skills and knowledge into too many sub-specialisations, and paying too much attention to learning tricks of the trade rather than to skill training in depth. Instructors lack pedagogical training; teaching materials are either insufficient or totally lacking. In certain cases the training period is far too long: apprentice training, based on the systems of some of the industrialised countries, may last as long as four or five years. The training given in undertakings also tends to neglect the related theoretical instruction, which is an essential part of the training not only for attaining the level of qualification immediately required, but also as a preparation for any further training and retraining made necessary by technological change. This low level of basic training has repercussions throughout the occupational structure. Foremen and highly skilled workers are of necessity recruited among workers trained by a weak system, and they in turn provide the material from which junior and middle-level technical and managerial staff, including vocational training instructors, are selected. Many large and medium-sized undertakings have tried to remedy this situation, and in some countries they are in fact the sole providers of trained workers with multiple skills; but much remains to be done, particularly in smaller plants and undertakings. Facilities for further training, which would help to make up the deficiencies in basic training, are either inadequate technically or else accessible to only a very small minority. Often they provide supplementary training for limited additional skills only and fail to give the necessary related theoretical instruction.

Although undertakings appear generally dissatisfied with the quality of the workers trained by the school system, it is by no means certain, at least when one looks beyond the immediate short-term results, that they have themselves been able to establish better systems. There are many reasons for this: a certain unawareness of the need for training, lack of adequate facilities, fear of pirating by competitors, to name just three. Whatever the reason, the result is that many countries have failed to exploit the training resources of undertakings and have established expensive vocational training institutions outside the industrial milieu. This is paradoxical, particularly in countries with a large public industrial sector. In such cases it would seem natural for the State to intervene directly and to expand the training activities of its own industries.

In recent years many countries have tried to remedy these defects. Vocational and trade schools and centres have been closed down or converted into institutions providing both basic training and related theoretical instruction for the different levels of training provided in undertakings. Comprehensive apprenticeship systems combining in-plant training and training in schools and centres have been set up in numerous countries of Africa (United Arab Republic), Latin America (Chile, Colombia, Peru, Venezuela), and Asia (India, Malaysia, the Philippines). A large number of countries are in the process of reviewing and modifying their training systems. But it does not seem likely that these efforts will suffice for training skilled labour in the numbers required. Moreover, although it is too early as yet for a systematic assessment of the results achieved, many of the newer systems have developed their own shortcomings. They have given birth to powerful organisations, but in doing so they have often become rigid, and the training they provide is not easily adaptable to the changing techniques of industrial production. Since their creation has not always been accompanied by a reform of lower technical and vocational education and training, overlapping has developed. Nor do the institutions always manage to maintain close links with enterprises, particularly with small undertakings which stand most in need of assistance. The courses given in the training centres are sometimes too long, and the facilities available are not fully utilised. Finally, the cost of these institutions is high, and there has been little analysis to discover whether the expenditure involved might not bring better returns if it were used for other purposes, e.g. if it were converted into massive assistance to training in undertakings.

Assistance of the latter type has begun to be organised on a systematic basis in a few countries (India, Mexico, Turkey, United Arab Republic). But a great many problems still need to be solved: employers and educationists must be won over, staff trained, appropriate curricula and teaching methods evolved, and some kind of supervision of the training instituted.

(ii) Middle-Level Personnel.

The quality of training for the vast range of technician and other subprofessional occupations seems to be the poorest of all. Teachers of technical subjects, whether in trade schools or in plant workshops, have a very low theoretical and practical instruction; foremen and supervisors lack pedagogical training and often do not master the skills of their trade. Technicians trained in the technical streams of general secondary education and in technical institutes of secondary or junior college level do not reach the required standard. Undertakings have therefore to resort to the traditional sources of technician recruitment, that is either the highly skilled workers (who do not, however, have the necessary theoretical knowledge and general education) or engineers. Most of the industrialists attending a Colombo Plan Conference held in 1966 stated that few graduate engineers could be employed as technicians.[1]

There are various reasons for these deficiencies in technician training. In the first place, the importance of the technician has been recognised only in recent years as industrial operations have become more diversified and been broken up into component parts as a result of technical change. In addition, technicians' functions are not given recognised status in the social hierarchy: they are sometimes performed by highly skilled workers, sometimes by junior engineers. Thirdly, students who take all their secondary education in technical streams leading up to a first diploma at technician level are often the least gifted students in secondary education. Fourthly, technical education suffers from inadequate organisation, partly because of lack of funds, partly because of shortages and shortcomings of teaching staff. Fifthly, co-operation between schools and industry leaves much to be desired.

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[1] C. BORJAL: *Education and Training Requirements for Technicians*, U.N.E.S.C.O. Seminar on Technical Education in Asia, Bombay, Dec. 1966, Document in Series A*.

Various arrangements have been made, in an effort to overcome these defects, to provide manpower already in employment with part-time training in schools—for instance by means of evening, correspondence or sandwich courses. But these are not yet satisfactory and raise a number of difficulties. Full benefit is often not gained from the theoretical instruction given because the job a trainee holds in industry does not give him the corresponding practical experience; the theoretical instruction itself varies considerably in quality; arrangements of the type mentioned are not practicable in an industry expected to grow fast, but in which at the time of training there are not enough technician jobs.

(iii) High-Level Personnel.

Similar problems exist for the high-level personnel categories, particularly with respect to engineers and managers. The number of students in engineering, commerce and business administration faculties is much lower than in such branches as law, the humanities and the arts; drop-outs are particularly numerous in the former group. The instruction received is too little geared to the requirements of industrial life. This is particularly noticeable in the case of business schools and colleges and university faculties of commerce.

Engineers.

The process of initiating future engineers into the practical problems of industrial life is particularly difficult in industrialising countries, many of which have adapted their curricula from those used in industrially advanced countries. Science curricula, in particular, do not always meet the requirements of industrial life. Teaching methods are stereotyped and do not allow students to participate sufficiently actively and practically in the process of learning. Universities and higher technical institutes rarely have the complete range of equipment which, in engineering schools in industrialised countries, supports high-level theoretical courses. Theoretical training and practical work are badly combined, and there is room for improvement in the content of the practical work. Engineering students in industrialising countries should be given a certain amount of additional or different knowledge because the engineer in an industrialising country does not always have at his disposal facilities such as the specialised libraries, professional study groups and journals which are within easy reach of his counterparts in industrialised countries. In addition, factories do not have enough experienced senior personnel to help newly qualified engineers. Finally, the importance of systematic in-plant training and further training after initial qualification is not given due recognition. The statement that " engineers are not made by a system which first teaches science in the secondary schools and at university and then expects industry to produce the practical engineer " [1] is therefore even more valid for industrialising countries than for countries which are already industrially advanced. There is no doubt that the shortcomings in training programmes for engineers in many developing countries form one of the most serious obstacles to rapid industrialisation.

Senior Management.

In many developing countries, the inadequacy—and sometimes the complete absence—of training programmes for innovators, entrepreneurs and management of undertakings reflects lack of recognition of the contribution which these groups can make to industrial development. This is due primarily to the cultural and social structure of many developing countries, particularly those in which a traditional and a modern sector exist side by side. Their education systems are not oriented towards the goals of an industrial society; educational programmes and methods do not encourage interest in new ideas. Young people tend to be more interested in entering non-technical professions or government service than in becoming industrial managers, when the latter's work does not enjoy equal social status. The pragmatic side of some management activities is often looked down on.

It is often said that managers and administrators are self-made and the success achieved by some of them is evoked as an argument against the introduction of training programmes. There are, however, large numbers of undertakings, especially medium and small-sized ones, whose low output is due partly to their antiquated organisation and management methods. It is not easy for the senior management of such undertakings to accept the idea of taking training courses. This is so partly for the reasons indicated above and partly because they do not appreciate the need for such training: they may see no point in improving products which they have no difficulty in selling; they may blame their difficulties on external restrictions (taxes, import quotas, foreign exchange problems) rather than on their own lack of ability; they may prefer to make high profits on a short-term basis.

Many countries have made considerable efforts to improve this situation. Centres have been set up or arrangements made for the development of management from undertakings of all sizes. But they are not sufficient. For one thing, many industrialists are not convinced of the utility of the new programmes, especially when these have been developed for use in very different cultural environments.

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[1] B. V. Bowden: *Report of the Committee Inquiring into the Feasibility of Establishing a Faculty of Technology in the University of Singapore* (Singapore, Sep. 1963).

COST OF EDUCATION AND TRAINING

Developing countries pay a high price for meagre results. Statistics on expenditure on education and training, which are far from including all activities (such as training in undertakings, private training programmes and sometimes even certain forms of technical training), indicate that such expenditure represents a substantial part of the national budgets of developing countries and a high proportion of their gross national product. Countries such as Burundi, Cambodia, Costa Rica, Dahomey, Peru, the Philippines, Tunisia and Uganda devote from 20 to 25 per cent. or even more of their budgets to education.[1] In Upper Volta 25 per cent. of the national budget is spent to provide 9 per cent. of the population with primary education.[2] Ceylon, China (Taiwan), Congo (Kinshasa), Ghana, Iraq, Kenya, Libya and the Sudan regularly devote a minimum of 5 per cent. of their gross national product to education and training.[3] In Nigeria the average recurring annual cost of a university student is higher than in an advanced country (nearly $3,000 per student), with a teacher-student ratio of 1:16.[4] Sir Arthur Lewis has estimated that the cost of a high-school teacher in the United States is equal to double the national income per head, whereas the equivalent figure in Jamaica is 12 and in Nigeria 30.[5]

ABSENCE OF AN INTEGRATED SYSTEM

The inadequacies mentioned above do not arise from insufficient recognition of the role of human resources in the development process. Indeed, it is possible that, from the beginning of the present decade, which has seen extensive acknowledgment given to the economic value of human resources, some countries have been too eager to invest in people, without having an over-all view of the problem and, in particular, of the criteria which would enable them to assess the costs and benefits of such investment. The crucial point seems to be the lack of a coherent policy, specifying the tasks of the various bodies concerned in training with a view to meeting carefully determined needs at the lowest possible cost. The growing importance accorded to educational planning is certainly a decisive step towards the establishment of such a policy, but it should not lead to facile optimism. Efforts to this end usually aim at making general and technical education programmes more effective; but they are not always linked very clearly with a country's industrial development aims and they do not cover the very considerable activities in industry, in public services, and even in the armed forces, which contribute to the education and training effort. As a result there tends to be rivalry among a multiplicity of government bodies, little or no co-ordination between them, and, in most cases, absence of a national forum for discussing major questions of general policy, working out agreements on objectives to be achieved, and allocating the tasks to be performed.

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[1] International Bureau of Education: *International Year Book of Education*, Vol. XXVII, 1965.

[2] NGUYEN Huu Chan: *The Cost of Instruction in Fourteen French-Speaking African Countries* (Paris, U.N.E.S.C.O., International Institute for Educational Planning, 1965) (Working Paper IIEP/PRG-AFR/65.II.I).

[3] U.N.E.S.C.O.: *Statistical Yearbook*, 1965.

[4] Frederick HARBISON: *A System Analysis Approach to Human Resources Development Planning* (U.N.E.S.C.O., I.I.E.P., May 1966) (Working Paper IIEP/9).

[5] Sir Arthur LEWIS: " Education and Economic Development ", in *International Social Science Journal*, Vol. XIV, No. 4, 1962. For another, more precise and comprehensive, measure of the cost of education and training see paper No. 1, p. 5, footnote.

There are, however, examples of co-operation at the working level between educational institutions and industry. Advisory committees have been set up to study the skills and training content of occupations, and to advise on training curricula and methods of instruction. Their advice, however, is often based on current practice or individual cases, insufficient account being taken of the future or of the situation as a whole, and their membership is not always representative of the real needs of industry.[1] The basic deficiency of such committees tends to be that they are not integrated into a logical over-all system of industrial training, with specific objectives and clearly defined elements.

The establishment of such a system appears to be a basic prerequisite for efficient industrial training policies.

It should be possible to look at the various constituent elements of human resources development as a system which is somewhat analogous to a system for the generation and distribution of electric power. In using this frame of reference, one can identify skill-generating centres, such as for example schools, universities, training institutes, and employing organisations, which develop people on the job. The linkages between such centres are analogous to transmission lines. The manpower problems encountered by developing countries, such as skill shortages and labour surpluses, may be thought of as attributable to power failures in particular generating centres, ineffective linkages between these centres, or faulty design which results in the failure of the total system to carry the loads expected of it. A system of human skill generation, like a system of electric power generation, should be designed to carry varying loads; it must have built-in flexibility to meet such loads; it must be adequate in size; and above all its components must be properly balanced. The systems analysis approach makes it easier to identify in operational terms major problem areas, and it compels the analyst to examine the critical interrelationships between various manpower and education programmes. It provides a logical starting point for building a strategy of human resource development.[1]

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[1] Hugh KING: *The Contribution of Technical Education*, Background Paper No. 2, Pan-Indian Ocean Conference on Technical Education and Training, Perth, August 1966.

II. Strategy of Education and Training

Countries anxious to attain specific objectives in the field of industrial development should evolve a general strategy in the field of industrial training. By " strategy " is meant here the systematic deployment of all available resources for the effective education and timely training of the personnel required for industrial development. As in military science, so here any such broad strategic plan must observe three principles: the principle of power, whereby each country must be firmly resolved to attain the goals it has set for itself and must deploy its forces with this end in view; the principle of security, whereby provision must be made to deal with unforeseen contingencies; and the principle of economy of means, whereby the main effort is devoted to the attainment of high-priority objectives and a minimum of energy exerted on goals of less importance.

Reference has already been made to the lack of co-ordination of available training facilities in general and technical education, in industry, in the civil service and in the armed forces. At present there is no universal recognition of the need for systematic, concerted use of all resources, for it is felt that the education and training arrangements have an inherent flexibility which enables them to meet the requirements of industrial development. The same view is often held in industry itself. Arrangements are often made, of course, to meet the specific training requirements of a particular industry or factory, especially with regard to jobs considered to be essential. But it is rarely realised that training activities have to be systematically organised, and the education and training authorities are often left to meet as best they can needs for skilled manpower arising from industrial projects. Even at the level of the individual undertaking, plans for training the staff of a new factory are often left a good deal vaguer than plans for the capital investment and equipment which the factory requires.

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[1] Frederick Harbison: " Educational Planning and Human Resources Development ", in *Fundamentals of Educational Planning* (Paris, U.N.E.S.C.O.-I.I.E.P., 1967).

This lack of systematic organisation causes a considerable waste of time and resources, and often holds up or jeopardises the implementation of industrial schemes. Hence the need to convince manufacturers, as well as the competent national authorities, of the need for a strategy of education and training for industry just as they devise and apply strategies for investment, marketing, and the material organisation of production. At the national level this implies unified planning and direction. Existing machinery may have to be redesigned or new machinery created in order to make this possible.

The strategy for industrial training should be integrated into the over-all education and training effort. Manpower does not enter industry alone, nor does it remain indefinitely confined to industry. The success of industrialisation policies depends on the quality of personnel in service occupations, in local government and in the civil service, as well as on the quality of industrial manpower. No description will be given here of the conditions which must be met if a general strategy for the use of human resources is to be adopted. But it should be stressed that adoption of such a strategy is an absolute necessity. The absence of an over-all strategy must not, of course, prevent the development of an industrial strategy; but the latter will be less effective or more costly for the country concerned when an over-all strategy does not exist.

It is not easy to co-ordinate separate training efforts each covering a different period so as to obtain a coherent whole. In the short run, manpower forecasts serve no very useful purpose. For skills which cannot be quickly acquired (in the case of very highly qualified staff such as engineers) there is no time to make the necessary adjustments in the national skill-generation system; existing staff have to be given further training (locally or abroad), or foreigners engaged. But the basis for long-term action has to be laid at the same time; and this action has to fit into a long-term plan. Hence the need for manpower forecasting.

As regards skills which are readily interchangeable and usually require a short period of training, any urgent action that may be taken should not prejudge the long term. Thus, when the undertakings themselves cannot train sufficient numbers for a particular sector of industrial development, recourse may be had to centres for accelerated training. However, care must be taken to prevent such centres from becoming superfluous or out of date; plans must, therefore, be made right from the beginning for their longer-term use. Here again, the need for manpower forecasts arises.

THREE PHASES IN DEFINING A STRATEGY

Three steps must be taken in establishing an education and training strategy for industrial development:

(a) determination of knowledge and skill required; inventory of training institutions; assessment of their output;

(b) decisions as to the goals to be attained;

(c) decisions as to the best division of labour between the school system and industry.

(a) *The Assessment Phase*

First, action to determine the training programmes should be based on the following data:

(i) It is essential to have *indicators* for " strategic manpower ", which will have the greatest impact on industrial development as a whole. Such indicators are necessary for certain occupational groups (senior managers and managers, middle-level technical staff; instructors; maintenance personnel), and for certain individual occupations (accountants, draughtsmen and electricians). They are essential if a long-term strategy is to be evolved, especially if there is a general industrial development plan.[1]

(ii) In the shorter run, it is useful to start from *manpower coefficients for individual industries.* As indicated in paper No. 1 above, such coefficients may be of two kinds. The first consists of the percentage distribution of the industry's total labour force among various occupational categories. The second consists of typical ratios between numbers needed in individual occupations or occupational groups, and the quantity of output.

(iii) In some instances, as when a factory is to be set up, there will be need for data about *over-all manpower requirements* and especially requirements in certain key posts or functions.

For each occupational group or occupation it is necessary to indicate the knowledge and skills required for normal performance of the job.

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[1] In a paper devoted to Iran George B. BALDWIN suggests that it would suffice for most countries on the threshold of industrial development to launch model vocational training programmes in the following seven fields: automotive and diesel mechanics, electricity, machine-shop operations, foundry operations, clerical work, modern building techniques and printing. (See Frederick HARBISON and Charles A. MYERS: *Manpower and Education, Country Studies in Economic Development* (New York, Toronto, London, McGraw-Hill, 1965).)

The information should include the general knowledge required (elements of science, technology and general education) together with the necessary occupational qualifications—not only manual skills (general and specific) but also intellectual capacities (linguistic abilities, grasp of special calculating techniques and of laboratory work, analytical ability, capacity for synthesis, creativity) and personal qualities (ability to make oneself understood and obeyed by others and to work as a member of a team). It is none too easy to define what is " normal performance " on a particular job: although the qualifications currently required should not be overestimated, at the same time provision should be made for the necessary foundation for further training. The definition will doubtless have to be based on the opinions of employers themselves and of other persons qualified to express a view, such as employment service specialists. This has been the line followed in the United States and, quite recently, in Nigeria.[1] Useful guidance may also be obtained from foreign experience and international comparisons.

Second, an inventory should be made of the institutions and bodies providing general education and technical training. While in many developing countries the educational planning authorities have undertaken a census of such institutions, allowance is rarely made for training carried on by industry—in undertakings, both public and private, in the training schools attached to them, or in the numerous technical and vocational training schemes organised outside the school system (e.g. by the armed forces). Even the technical education given within the general system of education is often covered less accurately than general education and university studies. Furthermore, such inventories are not designed with an eye to any particular sector of the economy, such as industry, but purport to cover all branches of activity.

Hence, it would seem important to make an inventory of all facilities for the generation of skills needed for industrialisation. The information gathered should be classified in a way showing the institutions that might be able to educate and train skilled manpower required for specific individual industries, in specific occupational groups, and for certain key occupations. The inventory should comprise a description of the main features of the bodies concerned (total capacity, teaching staff, equipment, origin of trainees, data on financial and budgetary matters), an indication of the number of persons trained, the qualifications obtainable, the effectiveness of the training provided (rate of drop-out, success percentage, jobs held in industry by former trainees, and at what levels), plus, if possible, training costs per head.

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[1] *Survey of Educational and Training Content of Occupations*, op. cit. Cited in paper No. 1, pp. 42-43.

Third, the results obtained should be compared with the pattern of occupational and skill requirements referred to above [1] as a basis for determining what should be done to improve or develop the existing skill-generation system. In the light of this comparison, it should be possible to decide on objectives and assess the tasks to be accomplished.

(b) *Decisions as to Objectives*

Action needed under this heading has been discussed in some detail in paper No. 1 above. It will be concerned chiefly with medium- and long-term goals. In certain instances, however, it should be possible to decide on short-term ones as well, such as, for instance, the recruitment of foreign workers or instructors, the organisation of emergency schemes to assist groups of undertakings, the rationalisation of factory training schemes, the conversion or closing of inefficient or unduly costly institutions, and the introduction of new curricula and teaching methods.

A decision as to the goals to be reached in training for industrial development gives rise to serious problems. First, quantitative estimates of manpower requirements comprise an element of uncertainty. Second, the qualitative indications which accompany these forecasts depend on the soundness of the analysis and judgment of those who drew up the lists of skills and knowledge required for normal performance on the various jobs. Third, translation of these data into terms of training and education presupposes that some idea already exists of the part to be played by each unit in the educational and training system, and of the way in which tasks will be apportioned among the various institutions and programmes, this being the purpose of the third operation. Hence, the three phases are presented here separately only to facilitate analysis. In fact, however, they are closely interconnected, though it will often be necessary to begin with a first approximation of the size of the tasks involved before going on to apportion them, which should then be possible with greater accuracy.

A number of factors make the situation rather more flexible than it might appear. First, human adaptability and the workings of the labour market together make it possible to meet many needs that are not specifically foreseen; second, many jobs can in fact be done by people with a fairly wide range of different qualifications; and third, the scale on which training in undertakings is carried on does not always call for very detailed planning.

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[1] See pp. 65-66.

(c) *Allocation of Responsibilities*

In practice, answers will be required to two questions. First, how much general education should precede or accompany the main types of industrial training? Second, how should this training be apportioned between industry and the other bodies concerned?

(i) The Requisite Basic General Education.

This will vary with the nature and level of skill required. But, for any particular level, the basic general education will vary, also, in accordance with the general educational objectives pursued by a country, the quality of the education given, the level of development and the degree of technical progress reached. It would seem that, in the case of occupations below lower supervisory level, there is a certain gap between the minimum general education required for industrial production and what one might call the social demand for education. The experience of both the advanced countries in the early stages of their industrialisation and the developing countries seems to show that a rudimentary vocational training can be given to persons who have received little or no education and even to illiterates. But experience shows, too, that a higher level of general education has been a considerable help in the early stages of industrialisation—both for the advanced and for the developing countries. In addition, from the viewpoint of industrial development, the minimum general education required for basic training at the lowest levels of industrial skill may not be the kind of education a man ought to have received who aspires to a job of great responsibility. This is a problem of some importance, in view of the numerous higher jobs filled by persons who began at the bottom of the vocational ladder. It also arises when workers are to be given further general education in addition to initial training. The requirements of industrial development may result in a programme which is too narrow or too exclusively practical, whereas both workers and society at large might have gained from a broader education, to an extent exceeding the cost of such education.

The complexity of these problems should not stop attempts to find answers. These will depend on two things: *(a)* industry's assessment of the basis of general education required for the various occupations and levels; and *(b)* the resources the country is prepared to devote to general education as such. Clearly, the general educational system should be able to provide at least the educational basis needed by industry; if it does not, it should be reformed or expanded. Otherwise, industrialisation schemes may be jeopardised. Assessment of general education requirements by industry ought to carry a good deal of weight when it comes to planning general education. Other factors, of course, must be taken into account as well, but, as far as industry is concerned, this condition is necessary and sufficient in itself. If, in addition, the general educational system can provide an education which goes beyond the requirements of industry, so much the better, for industry will probably derive advantage from it and the process of industrialisation is likely to be speeded up. But this is not a necessary condition.

(ii) Training by the School System and by Industry.

As noted in earlier parts of this paper, general education is the task of any country's school system. But in most countries the school system also concerns itself to some extent with more or less specialised vocational preparation—in technical secondary schools providing training in various types and levels of occupational skill, and in various university departments and technical colleges. In the terminology of the present paper such specific vocational preparation will be described as " training by the school system ". It is distinct from training sponsored—and possibly organised—by industry itself outside the school system, e.g. through apprenticeship and in-service and in-plant training schemes. For the acquisition of several types of skill, especially at the skilled worker and technician level, training by the school system and by industry are equivalent—basically similar skills can be learned through one or the other. Indeed, in many countries both methods are used simultaneously, some workers being trained by the school system and others, in the same occupations, by industry. Since the skills which can be acquired under both systems relate to occupations in which comparatively large numbers of workers are employed, it is of interest to consider which system is the better in given circumstances; in other words, how the training work involved is best divided between the two. The question is all the more important since in some cases it has given rise to occasional controversy.

In examining this question it is useful to distinguish three aspects:

(a) Training may be provided in the framework of an employment relationship (" training in employment ") or outside such a relationship (e.g. " pre-employment training "). In the former case the trainee has an employer who arranges for the training and bears at least part of the direct cost of it. In the latter case there is no such sponsorship by an employer; training takes place at the choice and responsibility of the trainee, or his parents, or someone else.

(b) Training may be given at a workplace (shop-floor, office, etc.) or in a special outside training place, usually some kind of school. In practice, training in employment is largely a matter of training at a workplace, while training outside of employment takes place largely at schools. But this is not always necessarily the case. An employer may send his trainee to a school for part of the training (giving him time off, paying fees, etc.), while a private engineering student, or a graduate engineer receiving a fellowship from an international organisation, may be placed in a factory for a certain period, to acquire some specific elements of practical experience.

(c) Technical schools may be part of a public education system, wholly governed by the educational authorities. Or they may be under some measure of formal control by industry, certain employers having a certain say—which may be considerable or even complete—in the programmes and policies of the schools. Technical schools over which industry has a substantial degree of formal control are referred to below as " training centres "; schools for which this is not the case are called " vocational schools ".

Most people would agree that, in examining the relative merits of the alternative courses under each of these three aspects, policy makers should be expected to aim at the optimum balance between costs and benefits. Where one method promises better results for a given cost than the other, the former should be chosen, while a method promising a given training result at lower cost should be preferred to a more costly alternative. On this assumption three practical conclusions may be drawn regarding the above aspects of the roles of industry and the school system in industrial training.

1. Any kind of training is more likely to meet industrial requirements for specific types of skill if industrial employers can make their needs effectively known. So that, other things being equal, training centres have the advantage over vocational schools wholly controlled by educational authorities.

2. Whether training in a given skill is better given in a centre or at a workplace depends mainly on the nature of that skill and on the training facilities available at centres and workplaces. The more specific the skill is to the work done at a given workplace (with its particular machines, organisation and methods of work) the more obvious it is that training is better given at the workplace. Otherwise trainees may learn to work on the wrong machines and acquire work habits out of line with those of the plant at which they are to work. General skills, however, the " theory " of certain occupations, are not confined to individual workplaces, and

can often be taught more conveniently in the quiet environment and by the specialised teachers of training institutions. On the other hand, training facilities in local plants may be highly inadequate even for imparting the specific skills that in principle are better taught at the workplace; there may be no instructors or no spare machine time, or the equipment itself may be obsolete. This is so especially in two kinds of plant—those that are badly managed and equipped, and those that are too small to organise training programmes even though they may be well managed. Both types of enterprise are more common in industrialising countries than in developed ones. Developing countries may therefore find it wiser to conduct training mainly in centres. In many cases, however, it may be both possible and preferable to give direct assistance to workplace training schemes rather than concentrate on training in centres. For instance, when the difficulty is due to lack of instructors, a central agency of the type proposed in this paper (Industrial Training Organisation) can " lend " them to individual enterprises, while medium- and small-sized firms may be encouraged to organise group training schemes. Such joint undertakings may work with their own teaching staff and equipment, or they may avail themselves of the facilities existing for pre-employment training programmes.

3. Training in employment as described above should, where possible, be adopted in preference to training outside the employment relationship, for—other things being equal—it has two major advantages. One is that training at the workplace is much simpler, and much more likely to receive proper attention, if it is given to the enterprise's own employees than if it is to be given to outsiders. Thus, in cases where workplace training is technically superior to school training, it is better organised as " training in employment ". But furthermore—as noted in paper No. 1 of the present volume—training in employment is given once a specific need for specific skills is clearly perceived by a specific enterprise. There is hence much less risk of people being trained in skills of less than the greatest importance and urgency—let alone skills for which there may be little demand or none at all.

The upshot of all this would appear to be that industry should play a much greater and more active role in the training of its manpower than has been customary in either developing or industrialised nations. More training should be given at the workplace; what remains to be done in schools should be controlled to some appropriate extent by industry—i.e. there should be a movement towards training centres; and as much training as possible should be given in employment. There are, however, three limitations of training in employment, which are commented on below.

(a) Such training cannot be expected on any large scale for skills that take several years to acquire and that are not precisely tailored to the needs of the employer concerned. Training in such skills is both costly and risky. The need for the skill would have to be foreseen by the enterprise long in advance, and the original expectation of that need might prove to have been wrong. Furthermore, the trainee may quit the enterprise during or after the training. Training of the type commonly given at universities and technical colleges cannot, therefore, be expected to any large extent to be superseded by training in employment. It is likely to remain largely what it has always been—a matter of public educational concern. Though even so it would be highly desirable in many countries for industry to be given some effective role in the determination of curricula, training methods and other policy issues, and to participate in the actual training process by means of suitable in-plant training schemes.

(b) Even in the case of skills that do not call for long periods of study, the risk that a trainee may become separated from the enterprise which trained him limits employers' willingness to provide training in employment. This is the case when the skills concerned can be applied also in other enterprises—in particular in competing firms. As stated below [1], this problem may, however, be met largely by systems of training levies-cum-grants to individual undertakings, and the establishment of an adequate administrative machinery to implement these measures.

(c) In developing countries industry often lacks the technical knowledge and staff for training.

The Industrial Training Organisation proposed below could help in overcoming these obstacles. But it will be obvious that the I.T.O. would have to play a major role in tackling all the problems examined in this section; it would, indeed, be both the nerve centre and the principal operating arm of a true industrial training system.

A NATIONAL INDUSTRIAL TRAINING PLAN AND ORGANISATION

It is recommended that each country should draw up a national industrial training plan to carry out the above-mentioned tasks. Such a plan should cover the entire industrial skill spectrum, from engineers to semi-skilled workers. It is suggested that the appropriate machinery for such a plan should be a national Industrial Training Organisation (I.T.O.)

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[1] See pp. 100-105.

possessing the requisite technical and administrative facilities. In this organisation, industry (public and private) would play a dominant part.

No model structure can be recommended for the I.T.O., since much depends on the degree of development of the country concerned, the scale and complexity of its industrial projects, and its political, governmental and administrative structure. Many countries have set up bodies which undertake these duties to some extent or other: vocational training commissions, national industrial manpower councils, planning commissions, special government departments, vocational training councils, co-ordinating bodies, and so on. But there is rarely an over-all coherent plan for industrial training. Very often basic questions fail to be settled, e.g. matching the training requirements created by the plan or other economic sectoral forecasts with existing training possibilities; co-ordination between manpower planning, educational planning, and the planning of industrial development (including industrial training); and, within the training machinery, co-ordination between the various activities (accelerated training programmes, management development, training in undertakings, long-term training of high-level personnel). Almost always, even when the need for co-ordination is emphasised, an over-all view is lacking.

The I.T.O. should be directed by a body empowered, at the national level, to decide on training objectives in the light of industrial development needs and on how such objectives should be achieved. It should have the technical and financial resources to enable it either to encourage education and training activities for industry in accordance with the policies laid down, or itself to undertake such activities. It should be made up of persons representing industry (governmental and private)—men responsible for planning and carrying out industrial projects, senior managers, trade union leaders, directors of education and training schemes for industry—and representatives of the government departments concerned.

This body should have available—or itself create—machinery for the assembly of the data it requires to perform its functions. The nature of these data has been indicated above. In countries where industry is still embryonic, such a central organ would in all likelihood suffice to provide a coherent industrial training system. Where industry is more developed or more diverse, the creation of similar organs in the principal industries should be encouraged, in which case such bodies would have authority delegated to them by the central organ and should enjoy a considerable degree of technical, financial and administrative autonomy, provided always that they conform to the guidelines laid down and work towards the same objectives. Subsidiary organs could also be set up within the bigger industries. It might also be desirable to create inter-industry regional bodies within each country, whenever regional problems are sufficiently important or regional industries are heavily interdependent.

One essential task to be undertaken by the I.T.O. would be to create or strengthen the links which should exist at every level, for the purposes of industrial training, between the general education system, vocational education, the various industrial training programmes and other institutions (productivity centres, professional associations, trade unions, small industry institutes, etc.). It should draw up training standards itself, or encourage their adoption (conditions of entry, examinations, certificates and diplomas), help in the establishment of curricula and teaching methods and equipment, supervise the training given, and provide practical assistance to undertakings. It would need adequate financial means, derived either from government subsidies or from contributions by industry (through the introduction of a training tax, or by other means) or from a combination of the two. A more detailed presentation of the financial aspects of the I.T.O. will be found below.[1]

III. Organisation and Financing of the Programmes

The purpose of this section is to bring out some of the practical difficulties involved in designing education and training programmes for industry as part of the strategy just defined. Two types of problems will be discussed: the organisation and content of these programmes and questions of finance.

ORGANISATION AND CONTENT

These programmes can be divided into two categories: *general* preparation for industrial employment, which is provided by the general education system, and *specific* preparation for employment, which is provided by a whole range of institutions and schemes from the national education system to training on the job.

(a) *General Preparation for Industrial Employment*

What changes can be made in the general education system in order to equip individuals to benefit from better vocational and technical training? The main need is to adapt educational syllabi and teaching contents and methods to the conditions prevailing in the country concerned and to the needs of industrial development. The type of change needed will vary widely according to the level of industrial development already attained. The principles discussed below, however, may be applicable to a number of countries:

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[1] See pp. 105-107.

1. The content of the general education syllabus (primary school, junior secondary (or middle) school and senior secondary school) should not only ensure progressive acquisition of knowledge but also so equip the pupils that, on completing a given stage or level of education, they are able to take up a course of initial vocational training. This would involve a far-reaching overhaul of primary education, which should be a self-contained unit since it is all the general education the great majority of the labour force will receive (as was the case in most of the economically advanced countries in the early stages of their industrialisation). Emphasis should be placed on the acquisition of basic competence in communication skills (reading, writing and verbal expression), enumeration, measurement and reasoning (arithmetic, science, analysis and synthesis), general culture (history, geography, the pupils' own environment), individual and group behaviour (character building, readiness to learn, civics, team work, health and safety) and creativity (handling and construction of various objects, appreciation of creative art). The age of entry to primary school should not be lower than seven.

2. The subsequent stage—junior secondary or middle-school education—should also form a self-contained whole. One of the most effective measures for achieving this objective would be to give it official recognition, possibly by awarding a certificate or diploma to pupils who successfully complete the course. Training for many industrial and administrative occupations can well begin after this stage. Full secondary education for entrants into such occupations is in many instances a luxury which countries that are highly industrialised today could not afford during the vital stages of their own industrialisation.

3. In both primary and secondary education emphasis should be placed as early as possible upon science teaching (both the exact and the natural sciences) not only for their content but also for their contribution to the intellectual development of the pupils. This is particularly important at secondary education level in which all streams, including the humanities stream, should devote considerable attention to mathematics, physics and chemistry.

4. Textbooks should take many of their examples from local conditions and economic life. This principle applies to the arts and humanities

as well as to science. Science—especially mathematics—textbooks should stress applications of theory to everyday life.

5. Teaching methods should be adapted in the first place to the characteristics of the pupils—by making intensive use of audio-visual aids whenever powers of visual and auditory observation are highly developed, appealing to the pupils' imagination, drawing on the wealth of popular culture—and in the second place to the characteristics of the economy in which they will be working. Active teaching methods should be used.

6. Compulsory courses of initiation into industrial life—involving visits to undertakings—should be introduced.

Educational planners have recommended or are considering a number of these measures in many countries. Such reforms will require enlisting the services of all qualified persons in the country for the modernisation of syllabi and methods. They will also require more intensive training of student-teachers, combined with updating and other further training for teachers already in employment.

The need for improving the quality of educational standards may have the effect of curtailing the general right to schooling. Alternative measures might therefore become necessary. In the case of pupils who have only had a partial primary education, U.N.E.S.C.O. is now endeavouring to work out functional literacy programmes to cater for the great mass of virtually illiterate adults. Such programmes, which involve more than the mere teaching of reading and writing, draw upon " all the forces in the nation and, in particular, local authorities and communities, educational, scientific and cultural bodies, public and private enterprises, non-governmental organisations, political groups, religious movements, women's organisations, and so on ".[1] Other schemes, such as periods of pre-vocational training combining an introduction to industrial employment with a brushing-up of the trainees' general knowledge, are in operation in a number of countries. For persons who fail to complete junior secondary school, evening classes and correspondence courses are widely used and are generally effective. Some countries are thinking of making it compulsory for all citizens who have had some education to contribute towards raising the educational standards of those who have not had the same educational opportunities (through extension services or other arrangements). The armed forces can do much to help, not only by organising literacy programmes for recruits but also through the educational work that can be assumed by military instructors in the areas where they are stationed. A number of countries have launched experiments of this type, e.g. Iran.[1]

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[1] *Final Report, World Conference of Ministers of Education on the Eradication of Illiteracy*, Teheran, September 1965 (U.N.E.S.C.O.).

(b) *Specific Preparation for Industrial Employment*

These programmes vary widely. At the lower levels of the occupational hierarchy there does not exist any single path; at the higher levels there is less flexibility but alternative means of access are still possible. Training programmes can be divided into three main groups according to the level of training involved. The first level includes industrial manpower up to and including skilled workers and lower-level clerical employees; the second level comprises foremen, supervisors, middle management, instructors and technicians; and the third level covers engineers, administrators and senior managers. In each of these levels a distinction is to be made between initial training on the one hand and further training or development on the other. Much of the following discussion concerning manpower of the first level is relevant, *mutatis mutandis*, for personnel of the second and third levels.

(i) First-Level Industrial Manpower.

This is the largest category, since it comprises unskilled workers, semi-skilled workers or operatives and skilled workers and craftsmen. Attempts are often made to classify training programmes catering for these workers by distinguishing between *school-based training*, i.e. training given in schools or centres, *training in undertakings*, which includes on-the-job training as well as systematic apprenticeship schemes, and *combined systems* under which training is given partly in a school or centre and partly in the undertaking.[2] These classifications are not wholly satisfactory for the purposes of this report. Quite apart from the fact that in many cases the first two categories are becoming increasingly similar (hence the evolution of the third category) and that the distinction cannot always be fully justified (a factory training centre is a school), the classification seems to help little in formulating and carrying out training policies because the criterion applied is the type of training arrangement and not the purpose of the training—industrial employment. Despite the risk of over-simplification, it is proposed here only to distinguish between *training in employment* (also known as "job-linked training ", " enterprise training ", " employer training ", " on-the-job training " and " training in undertakings ") and *pre-employment training.*

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[1] R. Blandy and M. Nashat: "The Education Corps in Iran: A Survey of Its Social and Economic Aspects", in *International Labour Review* (Geneva, I.L.O.), Vol. 93, No. 5, May 1966, pp. 521-529.

[2] *Training of National Technical Personnel for Accelerated Industrialization of Developing Countries*, op. cit., Add. 1 and 2.

Training in Employment.

A distinction should be made between initial training and further training.

The main characteristic of training in employment is that the trainee has a contractual relationship with the employer (a contract of employment or articles of apprenticeship). The training itself may be given on the job, in special training workshops and training bays, in schools run by individual firms or groups of firms, or in training centres or vocational schools, whether for accelerated or normal courses.

On-the-job training is appropriate for most semi-skilled jobs. These, including the operation of machines, can be learnt from an experienced worker at the place of work in a very short period of time, which may vary from a few days to a few months. Experience has shown that their skill content is so limited that it is not only expensive but generally inefficient to give the training outside the undertaking. Except in cases where workers come from an environment or area which has hitherto had no contact with industry, the trainees' low standard of general education does not constitute an insuperable obstacle. With improved primary education syllabi and better teaching methods, trainees should have little difficulty in making the adjustment to industrial life, including the observance of health and safety standards.

The quality of the training given on the job depends largely on the way in which it is organised. Clear, precise instruction sheets should be issued to the workers to ensure a systematic build-up of knowledge. Often, these instructions can be based on work study or on training methods employed in pilot plants. The standards achieved also depend, to a considerable extent, on the level of skill and teaching abilities of the experienced workers.

If the above conditions cannot be fulfilled, training on the job can be supplemented or replaced by initial training given in training bays or training workshops up to the point at which trainees can perform a good many production operations and carry out the more difficult tasks.

Trades and occupations which require training of more than one year's duration should be taught by a system combining practical work and theoretical instruction. *Apprenticeship* is the most systematic arrangement of this type. The training is given for the most part on the job. It implies teaching a range of skills composing a recognised trade and the provision of a specified amount of related instruction. It is organised in accordance with a contract specifying the obligations of the contracting parties, and at the end of his training the apprentice is recognised as fully qualified in his trade or occupation.

In many industrialising countries existing apprenticeship schemes have so far been handicapped by serious defects—to such an extent that in some cases the system has fallen into disuse even though the relevant legislation is still in force. These shortcomings are largely due to the fact that apprenticeship systems have been taken over, almost without adaptation, from the industrialised countries, with the result that the length of the training—sometimes as much as five years—and the skills taught no longer fit the needs of the industries in question. The systems also suffer in many cases from poor organisation, sometimes generally (lack of clear job descriptions, training plans, examination standards or administrative machinery), and sometimes in their details (unsystematic practical training and inadequate related instruction).

This should not prevent examination of ways and means of modernising apprenticeship for the training of skilled workers. The system may have proved defective in practice, but in concept it frequently seems to meet the needs of industrial development, since *(a)* the training is related to a particular occupation and is usually given in the setting in which the apprentice will be employed; *(b)* it entails systematic organisation of training for a clearly defined job, covering a specific period and allocating time to both practical work and theoretical instruction; *(c)* it is subject to training standards and proficiency tests; *(d)* it defines the responsibilities of both employer and apprentice; and *(e)* it involves a certain degree of supervision and backing from the public authorities.

Measures to improve apprenticeship systems should concentrate on—*(a)* ensuring that the length of training is determined in relation to the needs of each occupation, having regard to the adaptability of the apprentices; this will often involve, on the one hand, making a substantial reduction in the total duration and, on the other, varying the length of the apprenticeship according to the abilities of the individual apprentice; *(b)* establishing lists of apprenticeable trades, together with corresponding training programmes and examination standards; *(c)* establishing graduated stages of apprenticeship, each stage being open to trainees who have attained the level of the previous one, irrespective of whether it was attained as part of an apprenticeship scheme; *(d)* establishing a national body to promote industrial apprenticeship, with responsibility for setting standards and supervising training and examinations; such a body should systematically aid firms in need of help, assisting them to organise apprenticeship schemes, designing equipment, helping to arrange inter-firm training schemes, opening centres in which either part of the initial training (both theoretical and practical) can be given, or in which training and further training are provided for training officers and instructors.

The first three changes could be introduced without too much difficulty if the country has adopted the recommendations made in the second section of this paper concerning the classification of the qualifications needed for different industrial skills and the definition of the corresponding educational and training standards. The fourth change is bound up with the establishment of a national industrial training organisation of the type referred to earlier. The national body to promote industrial apprenticeship might be one of the branches of this organisation. It might constitute part of a wider scheme to promote all forms of training in undertakings. It might also become the organisation actually providing industrial apprenticeship training—in co-operation with industry—as in a number of Latin American countries.

In the latter countries, autonomous training institutions have been set up in which initial and further training are given during alternative periods in training centres or schools and in industry. At first, emphasis was placed on training taking place outside the undertaking, but there is now a tendency to co-ordinate these activities more closely with the training given by the firms, and the institutions are now drawing up training plans and standards for industry-based training as well as for their own centres. Similar schemes are in operation in other countries, e.g. the United Arab Republic, where apprenticeship for 58 occupations in eight industries comprises one year of initial training in centres run by the Government or by large concerns, followed by two years of training on the job.

Whether or not training in employment for skilled occupations takes the form of apprenticeship, its effectiveness depends largely on *(a)* the teaching and technical skills of the experienced workers and workshop instructors; *(b)* the organisation of the firm, particularly the organisation of its training; *(c)* the organisation of the related instruction; and *(d)* the general technical bases of the training (syllabi and standards, teaching materials and equipment). The first point is discussed later in this paper in connection with the further training of skilled workers and the training of instructors.[1]

Managements must be aware of the problems created by the organisation of training programmes and must take appropriate action: reorganisation of production, assignment of suitable technical and supervisory staff and instructors, proper planning and scheduling of the programmes, appointment of training officers. As there is a limit to the number of trainees who can be absorbed by a production unit, it may be advisable, when there are large numbers to be trained, to assign them to special training workshops, plant schools (if the undertaking is large enough), or centres operated by autonomous apprenticeship institutions such as those referred to above. Undertakings, particularly if small, can benefit considerably from pooling their training resources; in such cases the initial training can be given in group training centres. This method is useful for trades involving repair and maintenance work. Mobile teams of instructors could also be used.

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[1] See pp. 82-83 and 88.

The arrangements for related instruction depend on the size of the undertakings and on whether schools are available for giving theoretical instruction of a suitable standard. Large firms may be able to give either the required related instruction or the complete theoretical and practical training in their own workshops or schools, using their own engineers, technicians and management staff. In other cases, day release or block release for attending courses in nearby technical schools, or evening classes, or correspondence courses, are the systems most frequently used. The effectiveness of these methods depends on the quality of the schools concerned; but quite often insufficient consideration has been paid to whether, by improving the qualifications of the workers and systematically using their highly qualified staff for training purposes, firms could not themselves provide the necessary related instruction, either on their own account or through some group training arrangement.

The question of the best combination of periods of related instruction and practical training is one that is not easy to answer. Although it is difficult to generalise, owing to the variety of trades and subjects taught, it is perhaps safe to say that time off to permit attendance at classes of related instruction should not be too short, since very short breaks disrupt production and are less effective for training purposes. Unduly long periods spent on production work are also bad because they slow down the progress of training. The formula of block release, for a period lasting from one week up to a maximum of one month, has often proved successful. Evening classes and correspondence courses are also used, mainly in the case of small isolated firms, or if there is an acute shortage of qualified personnel. The practice of giving a short theoretical lesson in the undertaking every day, or every other day, has been followed successfully in some cases; it has stimulated both the employers' and the trainees' interest in the training and has generally made the training more effective.

As was stated earlier, a systematic apprenticeship scheme requires a schedule or list of recognised apprenticeable trades combined with appropriate training plans and examination standards. This is true of any type of systematic training for skilled work. An important task of the I.T.O. would be to carry out this essential preparatory work and to make its results available to industry. This task could be performed by national apprenticeship services, where they exist (as in South America), or be assigned to a special body set up to promote training in undertakings (Mexico), or be carried out or promoted by trade testing centres (Kenya). It should not be confined to providing the bases of initial training, but should cover all aspects of initial and further training in industry.

In the case of complex new industrial projects, initial training, in the absence of adequate training facilities in the undertakings, could be carried out by *accelerated training centres* sponsored by industry. Such centres have proved effective in some cases, but they have a number of serious drawbacks. For one thing, they are expensive. For another, they are intended to meet a short-term need, which may mean that the training is fairly narrow or may become quickly outdated. Before embarking on such expenditure, therefore, an investigation should be made of the feasibility and impact of investing the same sum on training in industry (whenever an industrial project is not starting from scratch and is to be spread over a long period), training in other undertakings (especially in the nationalised sector or in large firms), training key workers in other countries or having them trained by the firms building and equipping the industrial project.

The nature and content of these programmes must vary according to circumstances. In some cases the objective is to enlarge the workers' knowledge and skills and teach them more highly specialised skills within the same trade and at the same level of qualifications. In others the need is for systematic upgrading, based on the initial training given by one of the methods already described; this will enable the worker to move up from one skill level to another, e.g. from semi-skilled to skilled and later highly skilled. Further training may in some cases take the form of a prolongation of apprenticeship (involving a second and third stage). Alternatively, the need may be to adapt existing skills in the light of technical progress or changes in production processes; this is " retraining "—a term which also covers the acquisition of qualifications other than those originally acquired (e.g. training skilled workers to become specialised in the repair and maintenance of machinery).

Programmes of further training, whatever their objective, will vary widely in detail. Their content must take into account not only the minimum standards required but also the skills and aptitudes of the trainees themselves. In many instances it will be found preferable to divide further training into short periods involving a series of training sessions, each with a limited objective, so as to encourage the trainees and to make due allowance for their frequently limited general and theoretical knowledge.

In many industrialising countries related theoretical instruction is more important in the case of further training than in initial training; first, because of the low educational level of the workers on entry, and second, because of the higher degree of skill entailed. Related instruction should be concerned not so much perhaps with general scientific knowledge as with inculcating certain principles by means of courses of applied technology and experimental work. Development of the workers' level of general knowledge is also important. Probably recourse should be had more frequently to block-release courses for related instruction and, in some cases, to full-time courses in educational institutions.

Further training should occupy a key place in national schemes or arrangements for promoting or encouraging training in undertakings. An interesting experiment along these lines is currently in operation in Mexico. The National Service for the Rapid Training of Industrial Manpower has three tasks: to train and give further training to instructors in industry; to assist firms in organising their own initial and further training schemes; to provide a nucleus of permanent training facilities. The Service has a central unit, five area offices and 20 mobile units. Whether it is worth while to set up such a network depends on the scale of a country's industrialisation drive and the general organisation of its vocational training system. In many South American countries there are mobile units carrying out similar functions to those of the Mexican service but coming under the national apprenticeship scheme. Elsewhere, as in Cambodia, China (Taiwan), Tunisia, Turkey and the United Arab Republic, assistance to industry is the responsibility of productivity centres, vocational training institutions and centres for the training and further training of instructors and supervisors.

Pre-employment Training.

Training prior to employment is usually given in special branches of the educational system, in vocational schools (lower technical, vocational and trade schools, industrial arts and handicrafts schools), in vocational training centres or in centres for the accelerated training of adults.

In many countries the general education system includes a special technical stream, the first part of which may be complete in itself, designed to give initial vocational training for semi-skilled and skilled industrial occupations. The courses place equal emphasis on the acquisition of general and technical knowledge and practical skills. Sometimes this general and practical instruction is continued beyond the first part of the course in order to give pupils a better theoretical grounding and greater degree of vocational specialisation.

Vocational schools give courses for several different trades such as the woodworking, metalworking, engineering, electrical and building trades and clerical employment, or concentrate on a particular industry—engineering, building, etc. In theory, vocational schools should make good some of the shortcomings of training given in employment, and the best among them in fact do so. They should ensure that theoretical and practical training progress in step with each other; they should continue the pupils' general education and provide the link between school life and the world of work; they should enable their trainees to acquire their practical skills systematically, unhampered by the requirements of industrial production.

Unfortunately, many of them have serious shortcomings, which have been summarised as follows:

(i) the serious lack of balance between the numbers trained for a particular occupation and the number entering that occupation, since the majority of those trained often seek and obtain employment in other sectors, such as the army or the administration;

(ii) the considerable wastage during training which greatly increases the cost per pupil trained;

(iii) the insufficient adaptation of the training to conditions of work in enterprises, as well as to the speed and quality required on the job;

(iv) the shortage of personnel and incompleteness of equipment, since the funds available are not always adequate for the needs of technical institutions; and

(v) the inadequate qualifications of teaching staff, particularly workshop instructors.[1]

It is therefore recommended that the work of these institutions should be critically examined from the standpoint of their cost and efficacy. Some countries have already embarked on extensive reforms in this field. As a result, some vocational schools have been closed down; in other cases they have been converted to other purposes, e.g. to give courses of related instruction needed to complement the initial training and further training arrangements in undertakings, or to provide a wide variety of services (supplementary practical courses of further training, pilot workshops and laboratories, the production of teaching materials).

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[1] *Training of National Technical Personnel for Accelerated Industrialization of Developing Countries*, op. cit., para. 126.

The same applies to accelerated training centres whose courses are not directly linked with specific industrial projects, and are not industry-sponsored. The operation of such centres is justifiable only in so far as the training caters for the needs of industry, both as regards output of trainees and the type of skills taught.

There are situations, however, in which initial training must be given away from the place of employment, even though it may be difficult to eliminate all the drawbacks inherent in such a system. Some types of training cannot be given effectively within the undertaking. The best example perhaps is the case of the shorthand-typist, whose training consists of courses of further education and group instruction in techniques which can be taught more effectively in the classroom than on the job. The same applies when countries are still in the very early stages of industrialisation and the facilities available in existing firms cannot immediately be improved. In such cases vocational schools or training centres may be set up to give industry the manpower it needs and to serve as models for the introduction of modern training methods. This pilot function may continue even after training in undertakings has become widespread.

It is suggested that initial training should be given outside industry only if the latter's programmes are totally inadequate or incapable of improvement. It is also important that any pre-employment programmes should be based on careful analysis of the demand for industrial manpower and should be capable of conversion for other purposes (e.g. to further training) whenever this demand changes. In some instances the programmes might be sponsored by one or more firms.

Although the details of training methods are not to be discussed in this paper, attention might be called to the need to relate practical exercises in vocational schools and training centres to real production work. This is a very controversial question, but it should be possible—both in order to stimulate interest in the training and for economic considerations—to devise practical exercises which combine educational value and the conservation of scarce materials and resources.

(ii) Middle-Level Industrial Manpower.

This category of manpower consists essentially of foremen and supervisors, teaching staff and technicians. Technology varies widely, mainly because many of their functions overlap. An attempt will be made to classify the training programmes for the different subcategories on the basis of the main duties involved and their level.

Training of Supervisors.

Broadly speaking, the duties of foremen and supervisors fall into two categories: firstly, the supervision of skilled workers, which calls for a knowledge of the technical operations performed and often entails personal intervention to correct faulty work; and, secondly, the planning and supervision of production in a workshop, the detailed programming of the work to be accomplished and the assignment of this work to the various workers. Activities in the former category are often described as " functional ": they require the ability to direct the work of others, to give instruction, to maintain good working relations with the workers and to settle disputes, as well as special knowledge of safety and health rules and administrative and staff regulations. Duties in the second group require a knowledge of the technical processes employed in the workshop and in the factory as well as of systematic work organisation.

Where the general level of education and training is fairly low, the main emphasis has been laid on initiation into " functional " activities. To this end, courses have been organised, designed both to increase the supervisor's knowledge of his trade and to initiate him into instructing and supervisory techniques. Methods adapted from training within industry for supervisors (T.W.I.) are frequently used. Where the general level of the worker is higher, or where the technological standard reached by the undertaking makes it necessary, the training given must also cover the second type of activity; hence the need to organise courses of technical and related instruction giving a grounding in general subjects (mother tongue, applied mathematics, basic science) as well as technical subjects, and an initiation into the organisation and management of undertakings.

The " functional " courses should be given as far as possible within the undertakings, bearing in mind the need to relate the subjects taught to the daily work performed. They can then take the form of short special sessions centred, if possible, on a specific operation or series of operations. They should not take up more than a few hours per week. Courses of technical and related instruction generally involve attendance at schools or management-development institutes, productivity centres or instructor-training institutes. Part-time courses are the most common, as it is difficult for undertakings to do without their supervisory staff for a long period. There have, however, been instances of full-time courses which have been successfully completed without creating difficulties.[1]

These activities of supervisory staff overlap with the duties of instructors and technicians. Courses should therefore be planned to cater for the greatest possible numbers. For example, prospective foremen may attend all or some of the courses in teaching techniques for prospective instructors; as for related instruction, this can form part of the courses organised for future technicians.[2] These courses should, as far as possible, be organised within the framework of existing arrangements and make use of facilities already available. Where it is necessary to found special institutions for the purpose, they must be of a comprehensive nature—further training for different manpower levels, theoretical and practical training combined with advanced training for various functions and in different trades. The experience gained by the teaching staff of these institutions will often enable them to embark upon the production of teaching materials and the establishment of standards for training and pedagogical research.

In the case of new industries launched with the backing of foreign firms, advanced training for supervisory staff could be given by these firms outside the country. It may also be indispensable to have recourse to international further training programmes such as those organised by the International Centre for Advanced Technical and Vocational Training at Turin.

Training of Teaching Staff.

It is on the training given to teaching staff that the quality of the workers trained will largely depend; hence the importance of the training programmes organised for such staff, who include teachers in general education, teachers of theoretical technical subjects, and instructors in training establishments and in undertakings.

Teachers in general education are trained at pedagogical institutes and teacher training colleges. Their courses last from two to four years after completion of full secondary education. The teachers of theoretical technical courses are trained, likewise after completion of full secondary education, at a few specialised institutes generally within the higher education system. Their studies last from two to four years after completing secondary school in the case of those giving theoretical instruction up to the level of technician, and from six to eight years after completing secondary school for teachers of higher-level personnel. But these standards cannot always be attained, and many countries find it necessary, for example, to entrust such teaching to those who have merely completed their secondary education, usually in technical subjects, or to university undergraduates.

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[1] In Nigeria, for example, six-week full-time courses have shown good results.

[2] See, for example, the projects for supervisors and instructors (India, Morocco) and for instructors and technicians (Israel) carried out by the I.L.O. for the Special Fund.

The stress which reforms in general education lay on the teaching of science, on initiation into industrial life and on the use of modern teaching methods, should provide these teachers with a better basis for their work. But similar reforms need to take place in the training given to the teachers themselves. In a number of countries there appears to be a need for the teaching of science to be thoroughly overhauled; curricula and textbooks need to be brought up to date and adapted to economic life; more active teaching methods should be used; the regular updating of knowledge should form a recognised part of a teaching career, and special courses should be organised at universities and technical institutes for the élite of the teaching staff in undertakings. Senior managers should be encouraged to participate in the planning and implementation of these programmes, and arrangements should be made for future teachers to spend training periods in industry.

Related theoretical instruction for instructors in training institutions and in undertakings is normally given through either full-time or part-time courses at secondary technical schools or at special instructor-training centres or at comprehensive institutions of the type already referred to.

Future instructors for training institutions or undertakings should generally be chosen from among the best-skilled workers and foremen. Special attention needs to be paid to the following points:

(a) Those chosen should be thoroughly versed in the practical skills required—this may lead on occasion to the passing over of older workers whose productivity is on the decline, and will nearly always involve the provision of upgrading training.

(b) Useless theoretical knowledge should be eliminated[1] and pedagogical training should be mainly centred on practical aspects, thereby reducing the emphasis on some of the complexities of industrial psychology.

(c) Frequent updating courses will be necessary; it will often be preferable to provide for a series of limited training operations rather than an ambitious comprehensive course which would have the additional

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[1] An efficient method is that of the unit exercise: an operation is broken down into a number of sequences (or units) in which theoretical knowledge is imparted in conjunction with the manual work.

drawback of depriving industry of the personnel it needs for too long a period.

A large number of instructor-training institutes have been founded in the majority of countries in the process of industrialisation—often under the ægis of the United Nations Special Fund and the International Labour Organisation. They combine skill upgrading training, theoretical instruction and general education with the application of the knowledge and skill acquired. Arrangements are made for trainee instructors to give lessons under supervision.[1] These institutes have been highly successful on the whole. One of the major problems consists in making these training activities more uniform, whether those involved are intending to work as instructors in training institutions outside undertakings or as in-plant instructors. Differences should exist only where necessary to take account of the level of education and skill of individuals and not as regards the training arrangements in which these individuals must take part.

Training of Technicians.

This category embraces a variety of occupations which, on the one hand, are practised at various grades between the skilled worker level and the professional level and, on the other hand, involve functions of various kinds—technicians working in offices such as draughtsmen, and production technicians such as engine-testing specialists. Definitions proposed for this category of staff vary greatly, some stressing the fact that the work performed calls essentially for intellectual capacities while others draw attention to the need for technicians to be endowed with technical knowledge and manual skill in equal proportions; others again emphasise that many of the functions performed, even at a senior level, are more manual than intellectual. Training programmes will vary widely depending on the case.

Until quite recently, the majority of the different functions of technicians were performed either by highly skilled workers or by engineers or former engineering students who had failed their examinations or had not completed their studies, or by students from technical colleges or higher technical institutes. These four sources of recruitment have often shown themselves to be inadequate from the viewpoint of both quantity and quality. There seems, therefore, to be a need for a serious reappraisal of the different technician training programmes in the light of the real and changing needs of industry. Such a reform of programmes might be based, *inter alia*, on the following considerations:

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[1] For example in Algeria, Burma, Cambodia, Chile, Colombia, Congo (Kinshasa), India, Iran, Kenya, Libya, Morocco, Nigeria, Pakistan, Peru, Senegal, Tunisia, Turkey, United Arab Republic, Uruguay and Venezuela.

(a) To fill posts as technicians just above the skilled worker level, which involve operations closely linked with production, such as product inspection, the supervision of maintenance operations and specialisation in the use of certain equipment, regular courses should be organised to broaden the qualifications of the best of the workers already employed.[1] Such courses may be attended full time or part time, or they may take the form of evening classes or correspondence courses. In many cases, the necessary related instruction may be combined with that given to instructors and supervisors.

(b) Arrangements might also be made for some form of apprenticeship up to the second or third grade. The success of such arrangements will depend on the quality of the trainees accepted and the efficacy of the arrangements made both for related instruction and for work organisation within the undertaking.

(c) Far-reaching changes need to be made in full secondary technical education, the status of which should be raised in the national education system. It should be designed in such a way as to enable those who start work immediately upon leaving secondary school to fill a post after as short a period of adaptation as possible (junior technician level), as well as provide a sound general and theoretical grounding for those who continue their technical studies beyond the secondary-school level (technicians and higher technicians). This entails a thorough overhaul of the science and technical curricula.

(d) Short periods of training or work in industry should be systematically introduced. Secondary technical education needs to be organised in such a way as to provide the courses of related instruction needed to complement the initial and further training given in undertakings, whether in the form of day classes, evening classes or correspondence courses.

(e) Changes need to be made in higher technical education, whether at technical colleges or at specialised technical institutes whose curriculum covers the end of secondary education and the first two or three years of university. Such courses should be considered as terminal and not as

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[1] Some firms, notably a large concern in India, provide such opportunities for their more able workers with commendable success and organise their own training schemes for the advancement of their employees from the shop floor to the highest supervising grades. H. R. MILLS: *Report on Training Facilities at the Technician Level in South and South-East Asia* (Colombo Plan Bureau, Sep. 1961).

an inferior or truncated form of engineering course. An important place should be given to practical work and to familiarisation with the conditions of industrial life. This may be accomplished through regular alternation between work in the technical establishment and work in an undertaking or through training periods in industry, for example during the holidays; use can also be made of seminars, case studies, simulation techniques, etc., in industry or through industry. Contracts might be arranged between the latter and the institutes, covering mainly the practical arrangements for such training (alternation between the two, the exchange of teaching staff, the supply of equipment), and the relationship between the trainees and the undertakings concerned (pre-employment contracts covering a group of industries or undertakings). These technical establishments should also be capable of providing advanced training to technicians trained by them or by undertakings. Experiments along these lines are being carried out in a number of countries.[1]

(f) Special attention should be devoted to the subject-matter of the science and technology curricula in higher technical establishments. The nature of the subjects taught does not differ greatly from that of the subjects taught in engineering courses, but the range covered is narrower, the theoretical aspects are not gone into so deeply and a larger place is given to applied technology. Educators and industrialists must reappraise the nature and content of the theoretical training to be given to middle-level and higher technicians. Special attention should be given to subjects relating to the organisation and management of undertakings, and particularly to work study, the rudiments of costing, and industrial relations.

The provision of further training for middle-level industrial manpower is of great importance. Permanent arrangements for such training should be made between undertakings and scholastic institutions. In many cases the attendance of selected personnel at international advanced vocational training courses will have a snowball effect and may give a decisive impetus to national basic and advanced training programmes.

(iii) High-Level Industrial Personnel.

This category of personnel comprises mainly engineers and technologists and senior managers and administrative personnel of undertakings.

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[1] For example in Colombia, Hong Kong, Japan, Malaysia, Philippines, Tanzania and Venezuela.

Training of Engineers and Technologists.

Effective programmes for the training of such personnel should be planned with a view to remedying the shortcomings to which attention has been drawn in Section I of this document. They should be designed to take account of the probably poor quality of the general and scientific education received at secondary school. They should also be so organised as to combine the indispensable deepening of scientific and technical knowledge with the applied study of technological processes, in industry itself, or as close to it as possible. They should also endeavour to resolve the conflict between two contradictory requirements: first, the need to provide—in addition to the traditional engineering subjects (civil, mechanical, electrical and mining engineering)—a grounding in the specialised subjects which have emerged from technological progress (electronics, petroleum technology, etc.); and, second, the need to give a very broad training to persons who cannot avail themselves while at work of all the facilities available to their colleagues in industrialised countries for dealing with the host of practical problems which arise in a factory.

Far-reaching reforms appear to be necessary to achieve this. They should concern—(i) the syllabi; (ii) the methods used; (iii) the sequence of theoretical instruction and practical work; (iv) in-service training; and (v) courses of further training.

(i) One of the reasons for the drop-out of students in the first or second year of their engineering studies, and the impression of detachment from reality given by the training as a whole, derives from the over-large importance all too often attached to pure mathematics in the syllabus. Sometimes the engineering sciences themselves are not tackled in a down-to-earth manner until halfway through the course. A remoulding of the syllabi effected jointly by educators, scientists and industrial experts should make it possible for courses to be devised which, without hindering a thorough assimilation of the general principles, would devote time from the outset to the application of these principles. With this end in view courses should include subjects relating to the organisation and management of undertakings, and particularly the production function, costing and work study. In some cases industrial drawing courses need to be made more systematic. Finally, the rudiments of a foreign language should be taught, with the emphasis on technical terms, in countries which have no specialised engineering publications of their own.

(ii) Much could be done through the introduction of more practical and active teaching methods, for instance by curtailing the number of *ex cathedra* classes and replacing them by discussions and experiments.[1]

(iii) Far-reaching changes also need to be made in syllabi as regards the division of time between theoretical instruction and practical work in the undertaking. Some countries are even endeavouring to organise sandwich courses. One example of this is Malaysia, where curricula include courses on workshop technology and it is compulsory for instruction to be given in fitting, machinery, blacksmithing, welding and boiler-making in the university's workshops. All the first-year students are assigned to industrial workshops for two months during the holidays. In their third year students spend only two terms at the university: during the last five months they must attend practical courses at industrial establishments approved by the university. In their final year students are required to attend a survey camp, usually established within the framework of a rural development scheme.[2]

(iv) Such alternation obviously does not give a newly graduated engineer all the industrial experience he needs, the more so since during the periods spent on the shop floor the student engineer will more often than not have had to content himself with the role of observer without being able to play an active part. Since the spontaneous adaptation of the new engineer—alongside a more experienced engineer—is not the best solution, more and more in-plant training programmes are being organised which round off the training received by the engineer in the course of his studies. These courses vary according to the industry and the undertaking concerned. They provide a systematic and closely supervised guidance to young engineers and emphasise the development of abilities and exercise of judgment in concrete cases rather than the addition of further knowledge.

(v) Further training courses should be organised. They would take place one or two years after the engineer joined the staff of the factory; this would enable him to deepen his knowledge of the general and theoretical aspects which he had not been able to assimilate fully during his initial training, and whose importance for his daily work he would be better able to appreciate in the light of his own experience. Such courses are all the more necessary in that the new engineer training programmes based on the foregoing considerations may, in some cases, turn out a type of man whose theoretical grounding is less sound than it would have been under the traditional type of programme.

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[1] An expert has recounted how he explained the line transmission theory to student engineers in West Pakistan by putting them to work on a real telephone line; measuring the parameters and calculating the capacity of the line made it much easier for them to understand the underlying theory than if it had first of all been explained to them as an example of a Bessel function of a Fourier series.

[2] See the paper submitted by CHIN Fung Kee on item B.3 on the agenda of the U.N.E.S.C.O. Seminar on Technical Education (Bombay, 1966).

Training of Senior Managers and Administrative Staff of Undertakings.

These are the persons responsible for policy-framing, planning, organisation and management in undertakings. In a factory employing several hundred people, where four hierarchical levels can be distinguished —workers, supervisory staff, departmental heads and top management— the staff in question will come under the last two headings; they will include highly qualified persons such as market research and industrial engineering specialists. In a small undertaking, the only persons falling within this category will be the owner-manager and his immediate assistants. As in the case of the other categories of staff, a distinction needs to be made between management education and training programmes and management development programmes. Special care needs to be taken with the organisation of these programmes, not only in view of the strategical importance of this category of staff but because it is only quite recently that the need has been acknowledged for training to be given to managers and executives of undertakings.

On a short-term basis, efforts should be concentrated on the existing staff of undertakings, i.e. the courses should consist of a quick initiation into management techniques—as a whole or as regards selected aspects— followed up by a series of management development courses for senior members of the staff. These may take the form either of seminars and demonstrations or of a series of lectures, followed by instruction in a selected, limited number of management techniques, handled in depth and associated with practical work in a small number of undertakings. Efforts may be concentrated on industries and undertakings of national importance, and at times it may be necessary to limit the action to a few of the basic tasks of management such as industrial engineering and costing. Priority should be given to convincing managers and administrative staff in both the public and private sectors of the usefulness and importance of such activities. The initiation sessions will not suffice to convince them; there will have to be swift results. The first practical courses should often, therefore, start by dealing with productivity improvement at the operating level, and go from there to lay stress on production management and the specialised techniques involved such as work study, production planning and supervision and quality control.

By degrees, other management techniques, such as management accounting, market research and personnel administration, may be introduced. These specialised courses may be accompanied or followed by courses in general management. It may sometimes be preferred to concentrate first on the improvement of output and not to tackle the problem of market research until later. Technicians and supervisory staff might well attend such courses, especially on the practical side.

These courses should provide just enough theory to enable the participants to understand the principles underlying the techniques being taught, but the emphasis should be laid on practical application. They should not be copies of courses in countries with a different cultural background. The methods used should employ the most striking and effective media, e.g. audio-visual aids, books, programmed instruction, simulation techniques, in so far as these media are appropriate to the circumstances.

Stress should be laid in management development programmes on the importance of the rational organisation of training in the undertaking or sponsored by the undertaking. Special attention should be given to the proper timing of initial and further training programmes. The place and functions of the persons responsible for such training (training directors and officers) should also be made clear. It is essentially from among the teaching and managerial staff of undertakings that persons should be recruited to be responsible for all or part of their training activities. The training of such persons could be completed under the arrangements made either for instructor training or for management development, and the institutes existing for this purpose should organise special courses in which stress would be laid on organisational problems.

The size of management development programmes will depend on the importance of the industry concerned, the resources available and the needs. In countries where practically nothing has been done in this field the temptation to devise ambitious programmes will be great. Experience has shown that this is a mistaken policy and that it is better to begin on a modest scale. New programmes should be launched only after a review and assessment of all the programmes existing throughout the country, both public and private; any new programmes should be complementary and not competitive.

In many cases it will be advantageous to set up a national management development centre which can encourage, co-ordinate and supplement what is being done in this field. Such a centre will often be the starting-point for a series of programmes designed to meet the urgent needs of industry, especially large and medium-scale industries. Programmes for small-scale industries could come within the orbit of such a centre, unless they are handled by special institutes for the development of small-scale industries which can provide not only aid in connection with the management of undertakings, but also technical extension services, demonstration workshops and often direct assistance with credit and market research.

The programmes organised by such centres should not deal with every subject continuously at each level. While it is true that work study and costing are long and complex processes in which continuous training could be given—perhaps simultaneously in several undertakings—and while it is also true that a standard type of general management course could be organised throughout the year for industrial management—job analysis or market research courses need perhaps be given only twice a year.

It is hardly possible to make suggestions as to the size of such a centre, for example as to the number of staff required. Thailand, with a manufacturing industry employing 230,000 persons in 1963, had a management development centre with 17 professional workers on its staff in 1965, but separate facilities existed for small-scale industries. The Israeli Productivity Institute, catering for both manufacturing industry (215,000 persons in 1964) and the non-manufacturing sector (273,000 inclusive of agriculture), had 60 professional workers on its staff in 1965.

The question as to who should be responsible for these management development centres is a highly controversial one. Where such centres receive international aid, the government has to furnish counterpart funds, which implies that such institutions come under its control even if it is not formally responsible for them. Industry often complains of the inefficiency of " bureaucratic " government-run centres. The best solution might be to make these centres autonomous units under the wing of the proposed I.T.O., with their own executive body composed of representatives of all those concerned, e.g. ministries, planning authorities, employers' and workers' organisations, universities, professional associations of engineers, etc. There are also instances, mainly in connection with small-scale industries, of centres attached to development banks; this system has the advantage of making the granting of loans subject to strict requirements as regards the sound organisation of the undertakings concerned.

On a long-term basis the foundations of a better initiation of future industrial managers and administrative staff into industrial life should be laid. It has been suggested that the new general education programmes should include courses on initiation into industrial problems and that the instruction should be modernised by the use of textbooks and methods in keeping with the realities of economic life. It has also been suggested that courses on selected management techniques should be included in programmes for the training of technicians and engineers. These are undoubtedly the top priorities. As regards the systematic organisation of management courses at universities for students with no business experience, it does not appear that arrangements similar to those existing in some advanced countries can be recommended unreservedly for countries in the process of industrialisation. It will no doubt be preferable to concentrate on the gradual improvement of the quality of general and technical education in the country and to make permanent arrangements for initial and further training in undertakings. These arrangements will entail the organisation by industry and for industry, in co-operation with the universities and the technical institutes, of regular courses to be attended by future managerial staff who will alternate practical work with study sessions, and by present managerial staff for whom the courses will take the form of training periods and seminars. Recourse to international advanced training programmes will, in many cases, give an invaluable boost to what individual countries are doing on behalf of this category of staff, who are, without a doubt, the keystone in the industrial training structure.

(c) *Concluding Remarks*

It may be useful at the end of this section to emphasise some points, namely—*(a)* the necessity of linking the different programmes with one another; *(b)* the relationship between education and industry; and *(c)* the use of all facilities available.

(a) It should be stressed how important it is for the different programmes organised to complement one another. The following is an example of what this can mean in practice. In Kenya it has been decided to pool the efforts of the major training institutions, the National Trade Testing Centre, the National Industrial Vocational Training Centre and the Management Training and Advisory Centre, with those of the technical colleges. The Trade Testing Centre frames and checks the training standards for skilled workers, which make the levels of training uniform throughout the country and play a role in wage policy, since there is a fixed wage to correspond to each recognised level of skill. The Vocational Training Centre is to be opened near the Trade Testing Centre and will train not only foremen, but also instructors for undertakings and vocational training centres, give upgrading training to workers and supervise training in undertakings. Trainees who pass the examinations in these courses will be entitled to admission to technician

courses. Related instruction will be provided in the country's technical schools. Parallel with these activities the Management Training Centre will help to reorganise industrial undertakings employing workers who have attended these courses. Arrangements of this kind exist, or are planned, in a number of other countries.

(b) It has been proposed that co-operation between education and industry should be established first of all at the national level through the I.T.O. where they are both represented. This organisation will no doubt be setting up a certain number of joint committees and subsidiary bodies to deal with specific problems such as the remoulding of engineer training programmes, the training of clerical staff or the further training of managerial staff, for the whole of the industrial sector. But the setting up of advisory committees at the regional, local or occupational level would also be a useful aid in gradually evolving a common policy and uniform practices. Some of these committees might deal with matters such as the determination of occupational titles and of the skills pertaining to these occupations in a given industry. Others might study the practical problems of training for this industry, e.g. subject-matter of courses or layout of workshops.

(c) With a view to making full use of all the training facilities available, consideration should be given to the possibility of using such facilities as may be offered by youth movements, trade unions, clubs and community centres. Mention has been made of the role of the army in the campaign against illiteracy and to promote the spread of general education. It should be added that in some countries a systematic vocational training programme is organised for recruits.[1] It would also seem feasible to encourage organisations of the above-mentioned type to organise their own education and training programmes either to give pre-vocational training or to supplement what has been learnt at school or at work. Some of the programmes might be eligible for financial help from the I.T.O.

FINANCING

Here again, a distinction is made between general preparation and specific training for work in industry.

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[1] In Peru the army has five vocational centres which give training to recruits during the last three months prior to their return to civilian life. Courses are given, *inter alia*, in joinery, bricklaying, electricity, ironworking, plumbing, painting and the repair and maintenance of heavy vehicles. In two-and-a-half years 3,800 recruits have been trained. The intention is to turn out between 6,000 and 8,000 semi-skilled workers per year (the Peruvian army has 30,000 men). Hugh HANNING: *The Peaceful Use of Military Forces* (New York, Frederick A. Praeger, 1967).

General preparation—provided chiefly within the general primary and secondary education system—is financed mainly from public funds and by private contributions. By far the larger part of the necessary financing is provided by public funds, that is the national budget and contributions from public authorities at various levels. The money is paid out directly to publicly operated educational institutions and indirectly, by way of transfers and subsidies, to private schools and institutions.

By private contributions is meant the money paid by individual persons, when schooling is not free, and organisations (lay, denominational or professional) which wish to have a type of education which is not available in, or else is needed to supplement, the general education system. Such funds usually constitute only a small fraction of the total resources available, even when private education is on a relatively large scale, since the latter itself often receives public support of some kind or another.

Although it is not possible to discuss in this paper the numerous technical problems connected with the financing of general education, it can generally be said that action to affect the flow of investment, in the sense of the recommendations made in this paper, can be one of the essential instruments in an industrial education and training strategy. A change in the volume of public subsidies, or the abolition of such subsidies, the use of subsidies as a means of encouraging certain kinds of expenditure, or selective credit facilities awarded to regional and local authorities, can be just as effective as reforms introduced in the curricula or decisions to close down or convert existing training establishments.

If these instruments are to prove effective, their financing must be properly programmed. Education, clearly, should cater for the requirements of the whole country, not merely those of industry. This presupposes, in the first place, that the national education authorities participate in drawing up the industrial education and training plan, and accept it, and secondly, that they are able to reconcile the financial action required by the plan with the needs of other fields of education such as general education policy and training for other sectors of the economy. It also presupposes some centralisation of efforts, although excessive rigidity is to be avoided.

Specific preparation for work in industry—that is all programmes and arrangements for technical education, higher education and vocational training at all levels—is financed, at the national level, from three main sources: public money, industry (individual undertakings or groups of undertakings, trade and professional associations), and private individuals (trainees and their parents).

Public money finances the technical aids of the general education system and higher education (universities and technical colleges). It also finances certain programmes outside the education or university systems (management development centres, instructor-training centres, centres for teaching methods research), and meets the cost of assistance given to the training activities carried on by undertakings; it finances the national, regional or local co-ordinating and planning bodies and, as a rule, the general operating costs of the entire system—establishment of training and examination standards, general supervision, etc. Industry contributes substantially to all kinds of specific training through the training programmes organised in the undertakings, the contributions of trade and professional associations to individual and group training schemes, and direct financial participation in school programmes (scholarships, etc., for initial or further training).

In most countries the general rule is that specific training, both theoretical and practical, carried on outside industry is financed mainly by public money and by the individuals directly concerned, and that the cost of practical training carried on in industry is shared between industry and the trainee, the latter's contribution usually being a temporary reduction in his wage.

This general rule may be modified in two ways. First, public money may be used to finance practical training in industry through subsidies or other measures to encourage the employer to provide such training or by defraying part of the costs which the employer would normally have to bear. Second, industry itself may be called upon to shoulder part of the burden by paying a training levy—usually an apprenticeship levy. This is the case in a number of countries at different levels of industrial development, e.g. France, the United Kingdom and several countries in Latin America.

(a) *Training Levies*

The administrative rules governing training levies vary considerably from one country to another. In France industrial undertakings pay the Treasury a sum equivalent to 0.6 per cent. of their total payroll. In practice, about two-thirds of this sum can be reclaimed in exemptions. Briefly, such exemptions can be granted for—*(a)* wages paid to apprentices during their first ten months of training and with respect to the periods during which they are receiving related instruction, and other training costs, e.g. expenses incurred for special training facilities within the undertaking; *(b)* the firm's contribution towards setting up and running inter-plant training workshops; and *(c)* subsidies and gifts in money or in kind made to vocational schools or other training institutions. While the total sum derived from the French apprenticeship levy seems to have little or no effect on the Government's plans for the public vocational training system, the exemptions do encourage firms to organise systematic training in industry and to set up joint training establishments.

In the United Kingdom the training levy inaugurated by the British Industrial Training Act, 1964, was designed to be much more ambitious. It is part of a general industrial training policy and constitutes one of the chief instruments at the disposal of the Industrial Training Boards set up by the Act.[1] Each Board is required to impose a levy on all employers in the industry concerned. (Certain very small firms may gain exemption.) This levy takes the form of a percentage of each firm's payroll, except in one industry where the tax is a per head one. The rates so far applied vary from 0.5 per cent. (building) to 2.5 per cent. (engineering) of wages and salaries. The sums thus collected go towards financing the administrative expenses of the Board, the subsidies it grants, and any direct training activities on which it may embark. The Boards may grant subsidies to firms conducting approved training activities, although firms are not legally obliged to undertake such activities; they can also pay fees to specialist firms or other organisations to run courses for the industry. The rules governing the award of subsidies vary from one Board to another, but the total subsidy paid to a firm is not necessarily linked with the sum it pays in the form of the levy; indeed the subsidy may exceed the levy by as much as 600 per cent. These financial arrangements are intended to encourage and expand all initial and further training activities considered essential for the industry in question—from the manual worker to top management and from the young new entrant to the older worker requiring retraining.

In some Latin American countries the apprenticeship system provides for a levy on all industrial—and sometimes commercial—undertakings of a certain size. The levy varies from 1 per cent. (Brazil and Venezuela) to 3 per cent. (Colombia) of the total amount paid out in salaries and wages. This income is paid into a fund which finances an autonomous training system. The main difference between this system and the ones described above lies in the fact that in most cases there is little or no possibility of obtaining an exemption or refund.[2] This has led to a reduction in the amount of practical training in undertakings, although recently there has been a marked tendency among these autonomous systems to encourage such training, but by providing services to the undertakings rather than subsidies. Apart from these autonomous systems, financed from an apprenticeship levy or by the latter in conjunction with public funds, there exist in almost all the Latin American countries " competing " systems of vocational training financed from funds allocated to the national education system or from other public funds.

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[1] See paper No. 1, pp. 50-51.

[2] Even when it is legally possible for a firm to run its own training school, it seems exceedingly difficult to get the school officially recognised with a view to obtaining exemption from the levy.

(b) *Arguments for and against Training Levies*

Irrespective of the system adopted, industry must accept responsibility for a good proportion of the vocational training given (chiefly the practical training), especially when the training is peculiar to the needs of the particular firm concerned. In such a case, an employer will consider training expenses as part of his general financial investment in production. These expenses will consist of the wages paid during training, the direct costs of the training programme and the output forgone owing to the fact that the trainers supplied by the firm are not engaged in normal production work. Like any other investment, this will have to be profitable, that is to say the benefit to the firm should exceed actual outlay. But the investment may have been wasted if the trainee leaves for some rival concern or for any other reason.

This is no doubt the first, and a major, argument in favour of introducing a training levy. Making all undertakings contribute to a fund to be used either to meet the costs of training provided outside the firm or for improving training schemes in undertakings or groups of undertakings, will help combat the pirating of trained staff. The risk of losing a qualified employee is much greater if the skills he has acquired will be of use to him outside his own company. Firms may, therefore, tend to neglect non-specific skills in their training programmes and to recruit their skilled staff elsewhere. One way to solve this problem could be to arrange for the requisite training to be provided by the public education system; this is, of course, already being done with respect to broad general subjects, such as reading, writing and arithmetic. The same procedure could be applied to subjects such as carpentry and woodwork, wiring and electricity, and so on. Another solution is to reduce the cost of the training in the undertaking, so that the financial burden of losing a person who has been training is offset in part, at least, by a reduction in the sums invested in his training. This would be the effect of a training levy-cum-subsidy system.

A second reason for introducing a training levy is that not all employers are equipped technically for organising training for the necessary numbers or of the required quality within the undertaking. Some of them still need to be convinced that training is a form of investment, and therefore they neglect it, or fail to do any at all. The introduction of a training levy, together with a system of exemptions and subsidies, would help to remedy this situation.

Thirdly, the introduction of a levy system would certainly be an exceedingly effective means of financing a training programme for a whole industry or for a group of industries. Not only would it make all undertakings share in the expenses of the training, but it would also become possible, through the standards applied in the decisions to award exemptions to the levy and subsidies, to influence the training policies of the undertakings in the right direction. In addition, it would no doubt help to raise the level of skills throughout the industry, encourage the adoption of training standards, facilitate adaptation to technological change and foster mobility of labour. It would associate industry in the task of deciding on the rate, purpose and scope of the levy, the rate being subject to revision in the light of changing needs. It would provide a regular, automatic source for the financing of industrial training, including the running costs of the I.T.O.

A number of arguments have been raised against the training levy systems. These arguments, in so far as they appear to have some foundation, seem to challenge more the manner in which the levies are applied rather than their underlying principles.

The extent to which the levies may be a heavy burden for the employer will depend on the rate adopted. It is essential that industry should have a say in determining the rate, which should be reasonable and bear some relation to foreseeable requirements. An important feature of the British Industrial Training Act, 1964, in the United Kingdom is that the rate of the levy has to be reviewed from time to time. In any case, since training is as much an investment as any other, an assessment of 1 or 2 per cent. of the total payroll must surely represent a very minor contribution for an employer who decides to organise no training on his own account. On the other hand, should he decide to undertake some training himself, the system of exemptions or subsidies should relieve him of almost the entire burden. At the same time, the system helps to protect him against " pirating " and facilitates inter-firm arrangements, the establishment of standards and supervision of the training.

Calculating the levy on the basis of total payroll (the usual procedure) can be justified by pointing out that the amounts invested by an undertaking in training activities (and, hence, the benefits it can expect to reap in the shape of subsidies and exemptions) are, by and large, proportional to the size and quality of its labour force, both of which can be roughly measured by the amounts paid out in wages. But administratively, if it is possible to draw finer distinctions it might be well, in the countries where there is heavy unemployment among unskilled workers, to base the levy on skilled labour alone. Be that as it may, the levy can always be calculated in other ways: as a function of the number of persons employed, or the output of the firm, or the value of each production contract. Where administrative costs are heavy, some simplification in procedures should be possible.

It is difficult to imagine how a training levy could act as a brake on industrial development, since the whole purpose of the system is to encourage investment to further such development. In this context, the obvious case is that of the countries in the early stages of industrialisation. Provision can always be made for exceptions, and to introduce the levy system gradually. But even in such cases it will be well to ask whether the opposition to the levy cannot be attributed to a failure to appreciate the importance of the training function in industrial production, or simply to a desire to have the burden of financing it shifted to any sector other than industry. This merely postpones the problem and does nothing to solve it.

The suggestion that introducing a levy system would slow down the rate of employment is a theoretical rather than a real problem. If the employer, fearful of having to pay too heavily through the levy, cuts down the number of jobs, especially at the lowest levels, he will have either to reduce output or to introduce capital-intensive methods of production. In both instances it has yet to be proved that payment of the levy would be more expensive.

Another criticism is that the levy is too heavy an additional burden; undertakings already have to pay semi-fiscal dues to trade and professional associations to finance training, or make voluntary contributions towards the initial and further in-service training of certain categories of staff (management development courses, financing of studies in universities or institutes of higher learning, etc.). Such activities must obviously be taken into account when any of the subsidies or exemptions (which must be an integral part of the levy system) are awarded—provided, of course, that the activities are in accordance with the approved training policy for the industry concerned.

From the above, it would appear that a training levy, combined with a system of subsidies and exemptions, provides a method of finance well adapted to the strategy for industrial education and training outlined in this paper. It is, therefore, recommended that such a system should be established in countries where its introduction would not create any constitutional or legal difficulties and that it constitute in those countries the principal means of financing the I.T.O.

(c) *Financial Aspects of the Industrial Training Organisation*

It may perhaps be useful to summarise here the sources from which the I.T.O. would be financed and the types of financial assistance it would be able to render.

The income of the I.T.O. would consist of—

(a) the product of the training levy imposed on all industrial undertakings above a certain size; only very small firms would be exempt;

(b) public funds intended to supplement the above with a view to enabling the organisation to fulfil the purpose; in countries in the very early stages of industrialisation, such public moneys might be the main source of finance;

(c) funds supplied through international assistance.

The I.T.O. would be empowered to—

(a) award subsidies (or exemptions) to undertakings or groups of undertakings carrying out training programmes in accordance with the standards laid down by the organisation; such subsidies should cover a substantial part of the cost of these programmes; loans might also be granted, subject to support from development banks;

(b) provide financial assistance to public educational establishments and to institutions or organisations (trade unions, trade and professional associations, small-industry institutes, productivity centres, technical colleges, etc.) for such parts of their training programmes as meet both the needs of industry and the standards set by the organisation;

(c) finance training activities carried on under its auspices when the requirements of industry can be met in no other way; such activities might range from the establishment of comprehensive training centres to more limited arrangements for the training of instructors, the preparation of teaching material, or the purchase of equipment.

Contribution to Training Costs by Trainees.

Specific training for industrial employment receives finance from yet another source: the trainees themselves. Their contribution consists of either the fees they voluntarily pay for their own training or reduced wages during their practical training in the undertaking. As regards the payment of fees, people would, in all probability, be prepared to make a considerable financial effort if adequate facilities for initial and further training were available and were likely to fit them for higher-paid work. While it is a desirable social objective to assist workers to better themselves through awarding scholarships, loans or outright gifts (which could be financed partly by employers and partly from public funds), many workers in the developing countries may be prepared to take a share in the burden of providing training for industrial employment by making this personal contribution.

Foreign Assistance.

In both general and specific preparation for industrial employment, foreign assistance can be called in to fill the gaps. Such assistance may be public or private, bilateral, multilateral or international. No exact estimate has ever been made of the total amount thus contributed; it is probably very considerable. In countries which have recently become independent, a large proportion of national expenditure on education and training, including operating costs, is being met by foreign aid. This situation will have to be changed little by little; it is generally agreed that most of the effort in this field should be made by the country concerned, and that foreign aid should be selective and aim at filling the gaps and buttressing the national effort at its weak points. This, in effect, is typical of the international assistance provided by the United Nations and its specialised agencies, including specialised bodies for financial assistance. Through the award of loans and gifts, through direct contributions to all types of training activity (advisory missions, grant of fellowships for study abroad), through the provision of equipment, these organisations endeavour always to intervene in areas of primary importance and to train the key personnel. Such assistance may take the form of a comprehensive programme, e.g. the World Bank project in Nigeria, which covers a whole range of educational institutions—general secondary schools, technical and vocational schools, technical colleges and universities and technical teacher-training colleges. It may be concerned with the establishment of a specific institution—a technical university, science faculty, technical college, teacher-training college, a management development centre or a centre for the training of instructors and supervisors. The assistance may also concentrate on particular aspects such as, for example, further training and education (fellowship schemes for engineers, courses at an international centre for advanced technical training), assessment of educational and vocational training needs, the preparation of national plans in these fields, the establishment of standards and preparation of teaching materials.

It is, however, surprising that relatively little international finance, in the form of international capital transactions, has been made available for training, which is now generally regarded as an investment on the same footing, from the economic point of view, as investment in physical assets. It is suggested that such international financial assistance be made available to industrialising countries having established the proposed Industrial Training Organisation.

IV. A Few Suggestions for International Action

There is hardly a single aspect of the programmes considered in this paper which has not been the subject of action by some organisation of the United Nations family during the last 15 years. Hence, in this last section, the purpose will be not to describe the whole range of these activities, but rather to bring out a few points on which efforts should be intensified or concentrated. These will be discussed under three headings: *(a)* the definition and implementation of a suitable strategy of education and training for industrial work; *(b)* the organisation of effective programmes; and *(c)* ways of financing such programmes.

INTERNATIONAL CONTRIBUTION TO THE DEFINITION AND IMPLEMENTATION OF THE EDUCATION AND TRAINING STRATEGY

The purpose of international co-operation in this field is to complement national action where necessary and to enable all countries to profit from the common fund of knowledge and from international experience. To this end, it is essential that the organisations concerned, and especially U.N.I.D.O., the I.L.O. and U.N.E.S.C.O., should adopt a common approach to be reflected in their programmes. In this regard, efforts have already been made by these organisations, and these are being expanded considerably. The fact that some problems have not yet been completely solved is attributable not to inadequate co-ordination, but to the far-reaching changes which education and training are undergoing all over the world. The strategy which has been advocated in this document will increasingly demand the integration of activities which were planned separately in both countries and international organisations.

Such an integration will not come about through abstract reasoning or by dogmatising, but through concrete concerted efforts within each country. Three tasks ought to enjoy priority and might call for increased co-operation from the international organisations: *(a)* providing instruments to help in the formulation of the strategy; *(b)* preparing national plans of education and training for industry; and *(c)* establishing national industrial training organisations.

(a) *Provision of the Instruments*

The international organisations should strengthen the statistical basis required for planning education and training for industry (manpower statistics, education and training statistics). Their efforts, which would combine research and operations, should be devoted, *inter alia,* to the following:

(i) *preparation of the various kinds of manpower indicators, the schedules of skill requirements and the statistics* mentioned in paper No. 1 above and on pages 65 and 66 of this paper, namely occupational censuses in certain industries; surveys of the skills possessed by workers in various occupations within these industries; vocational training statistics; catalogues of qualifications required for key occupations;

(ii) systematic *inventory* of the various skill-generation processes, *determination of methods* for improving such processes and *analysis of the cost* of industrial training programmes.

The methodological work required in connection with these instruments could be undertaken at the world-wide or regional level, but the instruments themselves should be devised in individual countries or by small groups of countries. This process should provide valuable guidelines for action, while contributing to the standardisation of skill definitions, levels and requirements. A start should be made with research and pilot projects in a few countries before any really ambitious scheme is tackled, and the instruments evolved should be continuously improved.

(b) *Definition of the Industrial Training Plan*

Countries needing advice in this field could request U.N.I.D.O., the I.L.O., U.N.E.S.C.O. and appropriate financial agencies to send joint missions to assist them in determining how best to—

(i) survey the situation and decide on objectives mainly by using the instruments mentioned above and, as necessary, assist in devising such instruments;

(ii) define the main features and general framework of the plan;

(iii) integrate the various national and international activities involved (planning of industrial development, manpower planning, planning of education and training).

(c) *Industrial Training Organisation (I.T.O.)*

The international agencies should assist countries to set up this key organisation. They would do so by providing advice on its scope and objectives, its structure, its technical and financial means of action, its administrative problems, and by participating in its activities. (See pages 72 to 74 and pages 105 and 106).

INTERNATIONAL CONTRIBUTION TO THE ORGANISATION OF EFFECTIVE PROGRAMMES

The international agencies should concentrate on projects of three sorts: *(a)* those relating to the establishment or reform of education and training arrangements for industry as a whole; *(b)* those relating to a particular industry; and *(c)* those relating to techniques of education and training.

(a) *Better Education and Training Arrangements for Industry as a Whole*

International efforts should aim at assisting countries in improving the education and training arrangements for industry as a whole according to the priorities of national industrial training plans.

(b) *Launching of Integrated Projects for Particular Sectors*

The international agencies should be able to develop projects for the initial and further training of skilled personnel for a whole industry or for a particular industrial scheme. These projects would be an integral part of medium- or long-term industrial plans. They would cover, in a logical order, all skilled personnel, including senior managerial staff. Joint survey missions should precede the projects.

(c) *Better Education and Training Techniques*

International agencies should help in devising the new techniques of industrial education and training which modern systems will require. Their efforts should be concentrated chiefly on the following:

(i) development of models showing how programmes might be organised for various branches of industry and for certain key occupations (outlines of sandwich training schemes for managers, engineers, technicians, and middle-level staff; specimen syllabi in scientific and technical subjects at various levels; specimen syllabi of combined theory and practical training for future skilled workers);

(ii) preparation of manuals, pamphlets, and course outlines at various levels and in the principal occupations within any particular industry; some of these documents may be valid for use in several countries but most will have to be adapted to local conditions;

(iii) preparation of training equipment, such as models of school and workshop equipment, audio-visual aids of all kinds, and programmed instruction material;

(iv) establishment of model laboratories and teaching method offices;

(v) establishment of education and training standards (organisation and subject-matter of examinations, diplomas, supervision and inspection).

INTERNATIONAL FINANCIAL ASSISTANCE

Without the scope of what international agencies are doing in education and training being in any way restricted, special stress should be placed on four points on which international financial assistance might be given:

(a) the financing of joint international missions to help countries in devising an over-all strategy (page 108), or for launching sectoral projects (pages 108 and 109);

(b) direct financial assistance to national industrial training organisations to supplement their resources when no adequate national funds can be made available. International funds would be devoted to strictly defined aspects, such as programmes of advanced in-service training for managers and engineers, the establishment of a national experimental pedagogical centre to assist training in undertakings, the creation of national demonstration centres and national centres for examinations and standards, the establishment of mobile instructional units, etc.;

(c) the financing of comprehensive fellowship programmes to provide key men in industries of particular importance with further training;

(d) the financing of equipment, purchase of expensive machinery, and provision of foreign exchange for purchase of technical books and journals; this assistance might also take the form of long-term loans to finance certain key aspects of a general industrial training plan, the other aspects of the plan being financed from national resources.

Mention should be made of two further aspects of international action which might suitably be strengthened. First, there is the part which international agencies can play in providing information, especially through their technical publications and the world-wide, regional and national information centres available to them. It is most important that developing countries should have access to the experience acquired elsewhere. This is the responsibility of international agencies. Special efforts must be made to publish, in the field of training, technical journals, special studies and handbooks, bibliographies and systematic up-to-date catalogues. Second, the international agencies must make public opinion aware of the problems of education and training for industry. Employers' organisations and trade unions, teachers' associations, professional organisations and popular movements of all kinds have a very important part to play in the dissemination of ideas, and should themselves make a vigorous contribution to the activities described in this paper. Organisations such as U.N.I.D.O., the I.L.O. and U.N.E.S.C.O., by virtue of their facilities all over the world, can help these bodies to play their part.They must, therefore, make strenuous efforts to associate them with schemes for industrial training.

3. THE EFFECTIVE UTILISATION OF MANPOWER FOR INDUSTRIALISATION

INTRODUCTION

A number of problems concerning occupational requirements for industrialisation and measures to meet them are reviewed in papers Nos. 1 and 2 above. Some suggestions were made as to how national and international action could tackle these problems. It should be recognised, however, that unless accompanied by action to improve the use of the capacities and skills available in the existing and future labour force, the best manpower forecasting job and the finest training programmes will be inefficient or expensive.

The purpose of this paper is to examine issues calling for policy action, at the national and international levels, for improving the effective utilisation of industrial manpower in developing countries. Three major questions will be considered:

(a) How can the right people be channelled to industrial education and training streams?

(b) How can they be channelled to the jobs where manpower is required?

(c) How can the performance of industrial manpower be improved?

While it is obvious that these three questions are interconnected it is useful to distinguish between them in relation to different phases in time, namely the long term, the medium term and the short term. They may therefore suggest a logical sequence of measures to be taken. This does not mean, of course, that no action should be taken for the short or medium term before measures have been adopted for the long run.

This paper is divided into two sections: the first elucidates some important points arising under each of the questions mentioned above and suggests measures which countries might take to improve the utilisation of their industrial manpower; the second contains some proposals for international action.

Before these various points are dealt with, attention should be given to some general factors pertinent to the whole set of problems.

If workers are to be induced to acquire the necessary industrial skills, to go where their skills are needed, and to perform their tasks in a satisfactory manner, they must be reasonably committed to what has been called the " industrial order ". There is ample evidence that in many developing countries the commitment and the stability of industrial manpower still leave much to be desired. This applies both to broad social groups and to individuals.

One of the main reasons is that the cultural and sociological integration of traditional societies within the modern sector has not yet been fully achieved. Two important consequences of this are, first, that when traditional values and old forms of social organisation prevail, the participation of people in industrial work is unstable, that is there will be high rates of turnover and absenteeism, short periods of service, and lack of interest in the work; and second, that when industrialisation has destroyed the older values there is a certain time lag before people fully accept the new order, so that it is very difficult to instil the spirit of genuine interest and desire to innovate that are so necessary for industrial development.

Other important obstacles are ill health, malnutrition, inadequate housing facilities in urban areas, low urban wages, low social prestige of most industrial occupations, over-long working hours, and poor social climate of the enterprises—all of which contribute to the slowing down of acculturation required for progressive industrial development.

While it is generally accepted that the problem of attracting labour from traditional societies to industrial work " is much less formidable than it was thought to be " and that now there is a much clearer understanding of " the transitional characteristics of the phenomenon "[1], it is suggested that the anthropological and sociological factors—including the motivations of groups and individuals affecting utilisation of human resources for industrial development—be studied along with the technical and institutional aspects of industrial employment and training programmes. Manpower planning for industrial development requires such studies in order to set realistic targets and objectives and to suggest measures for attaining these goals.

The State, of course, has a very important role to play in removing some of the general obstacles to the commitment and stability of the industrial labour force. This includes improving hygiene, health, nutrition and housing, and granting subsidies to employing establishments where the cost of special programmes for stabilising the labour force would not match the expected returns to these establishments. It is suggested that in these matters, decisions of the State plus specific action described below be taken within the framework of a well-defined policy for industrial development, and that these measures be clearly identified and costed within the framework of industrial plans or programmes (including manpower planning).

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[1] United Nations: *Report on the World Social Situation, 1965* (New York, United Nations, 1966), Ch. X, " Commitment of an Industrial Labour Force ".

Employers and workers, particularly through their respective organisations, can also contribute to the removal of obstacles to the commitment and stability of the labour force. Employers can awaken a spirit of enterprise and innovation both within their firms and outside, instil a taste for modern methods of management and develop an awareness of the social responsibilities of management. They can improve supervision work and the general climate of the enterprise. Workers' organisations, in addition to defending the workers' interests, can undertake a number of activities which might also greatly contribute to the commitment and stability of the labour force, e.g. the reception of workers previously engaged in traditional occupations or coming from backward areas, helping these workers to adjust to their new working life and to the new social environment, and taking interest in improving the workers' living conditions and assisting them in organising their leisure time.

I. SPECIFIC MEASURES WHICH COUNTRIES MIGHT TAKE TO IMPROVE UTILISATION OF INDUSTRIAL MANPOWER

A number of points arising under the three questions raised in the introduction will be discussed briefly in this section. While it is recognised that different measures will have to be taken at different levels of development, the points discussed may be relevant to most developing countries.

(a) *Measures to Channel People to Industrial Education and Training Streams*

The main measures in this field include providing adequate vocational guidance, accompanied by steps aimed at raising the status of key industrial occupations, providing financial incentives and fringe benefits, properly selecting trainees for industrial education and training, and improving methods and programmes of education and training for industrial work.

General Vocational Guidance in Schools.

Few countries in the process of industrialisation have yet been able to set up educational and vocational guidance services capable of conveying to the mass of their young people information which will help those wishing to work in industry to come to sound decisions on occupational choice, and useful in helping them to put this choice into effect.

Effective guidance can be achieved only by close co-operation between the schools and the public agencies concerned with the employment market—the schools because they can convey to the children at an early enough stage that an individual can, to some extent, mould his own destiny as a worker and that one's choice of occupation should be made as rationally as possible in the light of knowledge both of employment prospects and one's own aptitudes and interests; the manpower administration because it can provide the necessary information about the jobs likely to be available when the young people are due to enter employment, about the nature of the work in each job, about the aptitudes required for it, about the training necessary after leaving school and about the conditions of work and prospects of remuneration and advancement. Consequently, it is for the school to advise the child on the best educational course to follow; to the manpower administration falls the task of directing the school leaver to opportunities of training or employment.

In countries with as yet no industry or only a narrow range of industry, an early step is to acquaint children with the idea of economic development and with the types of industry that development will bring. Teachers themselves need as part of their training systematic instruction on the subject of national economic and social development so that they may pass some of this on to the children. At primary schools, perhaps, little more can be given than some picture of what the future is likely to hold for the children. At secondary schools it may be possible to give students some notions of development plans, to impart an understanding of the interdependence of different projects, of time perspectives, and of the importance of the proper utilisation of the nation's human resources, and thus to stress the role of the individual in the national economy as a whole. Visits to such industries as already exist, visual presentation of other industries, and even a few days' trial employment in industry where this can be arranged, are often more effective than talks and printed matter.

Beyond this, comparatively little seems necessary in the way of guidance to channel young persons in the developing countries into unskilled or semi-skilled industrial work suitable for them. But considerably more is needed to induce young people to undergo the education and training necessary for the skilled jobs or the supervisory, intermediate-level, professional and managerial occupations for industry.

Raising the Status of Industrial Work.

It is important at this stage to break down any false ideas derived from past traditions. In a wide range of developing countries the same phenomenon is found: the primary consideration of young people in choosing a job is the status it is assumed to confer rather than its intrinsic merits, the contribution it makes to the economy or the opportunities it offers for genuine self-achievement. Many views on the relative status of different occupations stem from evaluations which no longer correspond to reality and which will be even less justified when the youngster concerned reaches the peak of his career. To correct such views is easier said than done. If, for instance, independent lawyers or government officials have for generations been recognised as having a higher status than engineers in industry or factory managers, it is not enough to present the schoolboy with information to show that this will not always be so; nor is it enough that his parents and teachers should be so persuaded; a whole cultural tradition must be changed.

Sociological inquiries into the prestige rating of different occupations throw light on " mental blocks " of this kind, and it should be the deliberate policy of governments to raise the status of those occupations necessary for development which do not at present enjoy the prestige which is their due. One aspect of this is the persistent problem occurring in almost all countries which have no long industrial history: that of prejudice against occupations having some manual content and of an exaggerated preference for desk jobs.

Governments can do much to raise the status of key industrial occupations, particularly by two sets of measures: the establishment of appropriate wage and salary differentials (on the basis either of skill or of type of occupation, e.g. manual/non-manual), and the conferment of national honours and titles. These measures should be supported by campaigns in the press and other media to change the public image of these occupations. The question of wages and salaries for industrial work will be mentioned below. As far as the second question is concerned, it should be one of the tasks of the proposed Industrial Training Organisation (see paper No. 2, pages 72 to 74) to submit a systematic pattern of technical education and training. Successful students at specified levels would be awarded a recognised diploma or title giving access to better-paid key occupations, e.g. technicians at different levels, junior engineers, specialists in management techniques. National competitions for skilled craftsmen in a number of key industrial trades and national honours for particularly successful industrial workers should be organised and widely publicised, accompanied by financial rewards where necessary.

Information on Industrial Occupations.

Concurrently with these measures, information should be collected concerning the occupations which already exist in the country, on those which will be expanding and on those which will be introduced with the establishment of new industries and the modernisation of old ones. This information should be put in the form of occupational monographs or career handbooks available to the manpower services (vocational guidance, placement) and—possibly in a simpler form—to schools.

Information needs to be collected on the following items:

(a) the nature of the work—what is done, how and why it is done, under what conditions it is done, and how it is linked with the work performed in other occupations;

(b) where persons are, or will be, employed in the occupation considered;

(c) what aptitudes, minimum educational and other qualifications and specific training it requires;

(d) what the employment outlook is—number of openings forecast in relation to the present number employed in the occupation;

(e) the average earnings and chances of advancement;

(f) how to obtain detailed information and how to apply for training or employment in the occupation concerned.

Many models for presenting this information exist in industrialised countries; they should not normally be followed without adaptation. The essential need is for information to be presented in the right way to be digested by—and to appeal to—the young people to whom it is addressed. The presentation may differ according to the educational level of those being addressed; there may, for instance, be less written material and more photographs when operations demanding lower educational qualifications are dealt with. Great caution must be observed in borrowing photographs from other countries, since people will have difficulty in identifying themselves with a situation which is obviously from a different milieu.

Individual Guidance.

While general publicity and group guidance activities of this kind prepare the ground, many youngsters need individual guidance. This is time-consuming and therefore costly, needing well-trained vocational guidance personnel. In this matter, developing countries must decide on priorities: which groups of the population is it most important to guide into channels which will make the best use of their aptitudes and interests? In most cases it is best to start with the children with secondary or intermediate education in the more important population centres, and to concentrate on key industrial occupations.

Individual guidance again is a matter of collaboration between the schools and the manpower services; the schools because they have a record of the pupil's performance in certain subjects over several years and some knowledge of his personality; the manpower services because they know of the openings in industry and the characteristics required of the workers who are to fill them, and because school leavers are often more disposed to take advice from the world of employment than from the teachers whom they have known during their school years.

In industrialised countries the practice is becoming more widespread of having a twofold service: selected teachers in each school specialise in general occupational orientation, while the external vocational guidance service is available to supplement this and to give individual guidance interviews and introductions to training opportunities or jobs. In countries which have aptitude-testing services, these can prove extremely helpful in special cases, but the general application of tests is usually ruled out by the great numbers of persons involved. In connection with the school service, attempts are being made to bring the teachers and industry more closely into touch with each other, and this is a step which industrialising countries might adopt from the start.

Advice is not always accepted, and where it is, it may prove to have been wrong. It is therefore important for vocational guidance not to end abruptly when the youngster enters training or employment; the service needs to follow up within, say, six months or a year to see whether he is making a success of the training or job he entered and, if not, to attempt to place him in other employment or training while there is still time.

Vocational Guidance as a Tool of Industrial Manpower Planning.

Lack of resources seriously limits group or individual vocational guidance activities in many developing countries. Therefore, the benefits to be derived from such activities should be compared with their cost. While national campaigns and information in schools should be quite broad, heavy emphasis should probably be on specific groups of the school population and on key industrial occupations, particularly the high-level ones. In any case, close links should be established between education and training institutions on the one hand and industry on the other, and guidance and counselling services should be part of the machinery for the planning of industrial manpower and educational development. Finally, enterprises should co-operate with these services in their own interests, by supplying information on occupations, arranging for visits and so on.

Financial Incentives and Other Benefits.

Governments can provide financial incentives to encourage people to seek education and training for selected strategic occupations. This could be done through the national Industrial Training Organisation proposed in paper No. 2. They might take the form of sholarships, student wages, etc., in the case of schools, and of subsidies for specific on-the-job training schemes, including certain apprenticeships. In general, the policy might be for industry training schemes to receive public assistance funds commensurate with those received by the general education system. In addition, special fringe benefits, such as boarding facilities, free or subsidised meals and housing for trainees and their dependants, special holidays, and so on, might be provided for students in certain crucial occupations.

Selection for Industrial Education and Training.

In view of the high cost of many industrial education and training programmes, attention should be given to a more efficient selection of trainees, particularly for high-level manpower. Schools as well as employers could be more selection-conscious than they are now. Very often the admission of candidates is haphazard, or based on criteria having little relevance to the optimum utilisation of training facilities. Proper selection can be made only on the basis of an adequate job description based on proper analysis of the work to be carried out. The qualifications of applicants must match the requirements, and selection be made accordingly. This is often difficult in countries where family or personal relationships play an important role. Those responsible for selection must, at least, make sure that applicants so sponsored have the qualifications corresponding to the job specification.

The selection process may include aptitude tests appropriate to the type of work required. Arguments have been advanced for aptitude-testing programmes in industrialising countries. They can be summarised as follows:

(*a*) as children have had relatively little experience of using mechanical devices their past record provides little clue as to their possession of the abilities needed for skilled occupations in industry;

(b) for much the same reason, there is little of the self-selection which operates in industrialised countries to eliminate the less suitable applicants; and as few, if any, applicants have been able to profit from vocational guidance, many apply in ignorance of the requirements of the occupations concerned;

(c) where suspicion exists, rightly or wrongly, that factors unconnected with the requirements of the job, such as ethnic origin or political connections, are taken into account in selection, aptitude-testing provides some assurance that objective criteria are used;

(d) in any event, a good system of non-verbal aptitude tests counteracts distortions due to regional differences in education opportunities and, in plurilingual countries, to differences of mother tongue.

However, aptitude tests are not so simple or infallible as they sometimes appear to laymen. In fact, they are dangerous except in the hands of the occupational psychologist or other persons specially trained in their use. They must be planned with care and be of proven validity for the type of applicants presenting themselves for selection in the country concerned. The blind application of tests developed in other countries, with translation of instructions into the local language, is fraught with danger.

By "proven validity" is meant that tests must be shown, in practice, to have some predictive value with the type of applicants involved, in discriminating between those likely to do well and those likely to do badly in the training offered.

In selection for training courses in a range of skilled mechanical trades, it has been demonstrated in developing countries that a well-balanced range of tests covering abstract reasoning, analogies, numbers and ability to handle visual space can be administered by personnel trained in a fairly short time and at reasonable cost, and that the results give a useful prediction of ability to follow the course. Manipulative tests have not been found necessary at this level, since although a fitter or radio mechanic, for instance, works with his hands, his real skill depends far less on his manual dexterity than on his mental power. Moreover, manipulative testing can be done only in small groups, which makes its cost in staff time prohibitive.

The testing of aptitude to undergo training does not of itself assure success in training, or in the occupation concerned, since motivation and, of course, actual developments in the employment market also play their part. Tests therefore need to be seen as an element in the selection process, to be used in conjunction with other methods such as interviews and consideration of school record or other references. And the security of tests must be safeguarded—their purpose is frustrated if applicants obtain advance copies by underhand means.

If aptitude tests are well organised and adapted to the situation prevailing in the country, the decisive factor may be, in many cases, their cost as compared with the waste of resources in industrial training programmes by improper selection. Whatever the validity of aptitude-testing programmes, they should be organised only for specific occupations requiring costly training and education.

Incentives through Improved Education and Training Programmes.

It is important to note that reforms in education and training programmes and methods will, in themselves, be strong incentives to attract people who are reluctant to go through traditional or rigid education and training schemes. Such reforms have been discussed in paper No. 2 above (see pages 74 to 98). In the short run, changes in the organisation and methods of in-plant training and upgrading can play an important role. In the long run, increasing the number of openings after incomplete secondary or higher education, and removing the barriers between various levels of education, are crucial. Finally, attention should be given to the proper geographical dispersion of education and training facilities within the framework of industrial development programmes or projects.

(b) *Measures to Channel People to the Jobs where Manpower Is Required*

Measures to improve the machinery which will enable the employment market where manpower is required to function properly and to establish appropriate wage and salary differentials for industrial manpower promote the proper channelling of the right people to the right jobs.

Improved Employment Market Machinery.

Incentives to qualified workers to take up those jobs where their skills will be best used need to be backed up with machinery to see that they know of those jobs and are helped to apply for them, and to assist undertakings in finding the best-qualified workers available.

Personal introduction or the " grape-vine " are still not to be despised as ways of contact between worker and job; and, with an increasingly well-educated labour force, press advertisements also result in a high number of successful matchings of workers and jobs. But there are advantages in supplementing these by a public service having specific responsibility for organising the employment market. By this is meant collecting and publicising up-to-date information about jobs and job-seekers for the mutual benefit of workers and employers and helping to bring the two together where they would not otherwise have made contact; the purpose is to ease the workings of the employment market, not to force them into the channels of a state service. In order that the service meets the real needs of its users and does not become a mere bureaucratic instrument, it needs the advice of representatives of the employers and job-seekers and trained personnel to distinguish, with the help of industry, the qualifications required for different jobs and to recognise the suitability or unsuitability of candidates. Such a service should also be organised within the framework of a national strategy for training industrial manpower and to have close links with the proposed Industrial Training Organisation.

In the industrialised countries public employment services have traditionally been concerned mostly with workers in the lower level of skills; attention to professional and managerial workers only came later. In the industrialising countries there are arguments for reversing this order and for concentrating first on the strategic personnel whose correct placement is of greatest importance to industrial development. It is recommended that the growing practice in industrialising countries to set up professional registers for people with scarce technical skills, whether immediately seeking employment or not, be encouraged and expanded. These registers not only give the authorities an idea of how effectively such people are being used, but also enable them to make better placements and, in an emergency, to fill vacancies rapidly. Qualified nationals completing their studies abroad, or employed abroad but willing to come home when the right opportunity arises, should also be included in the lists. Registers of this kind can also tell when no national personnel are available to fill a vacancy and can without undue delay give permission for the recruitment of foreign workers; they can even help in establishing relations with foreign governments and in taking part in the recruitment of foreign workers.

In the early stages of industrialisation it may be that, once an industry has been manned, great fluidity in the employment market is not desired: but with the expansion and diversification of industry the need for fluidity grows. Manpower planning deals with broad occupational groups and presupposes a fluidity of the employment market and the cross-transfer of trained personnel not only from one undertaking to another but in appropriate cases from one industry to another. In fact, movement from one industry to another may be the only way in which a person can obtain advancement and realise his full potential.

Facilitating desirable personnel mobility of this kind is not only a matter of putting job-seeker and prospective employer into touch with each other; it is a matter of removing any obstacles to the worker taking up his new job.

In industrialised countries with high levels of employment it has been found economical to spend quite substantial sums of public money in helping workers to take up employment in another part of the country, or to transfer from a declining industry to an expanding one. Payment of family removal expenses, settling-in allowances, assistance with rehousing, retraining and payment not far short of normal earnings during this retraining, are all considered fair charges on the public exchequer; in Sweden in recent years, as much as 4 per cent. of government expenditure has gone on " active manpower policy " measures of this kind, and the conviction is held that this expenditure has justified itself by the benefits resulting from the rapid transfer of manpower resources to where they can be more productively used, by avoidance of the loss of production due to unemployment, and by its braking effect on wage inflation.

In developing countries expenditure of this magnitude may not be appropriate; nevertheless the economic loss which occurs if a job is left vacant when a suitably qualified worker is available somewhere else in the country might well be relatively greater, and attention needs to be given to any measures of active manpower policy which the government might take to limit this loss.

Wages Policy.

Measures affecting the level, structure and rate of increase of industrial wages are among the most powerful instruments of allocating the industrial labour force as required. Labour mobility will be influenced by the establishment of appropriate wage and salary differentials for industrial manpower as between public and private employment, rural and urban industrial employment, different national industries, different occupations (manual or non-manual) and domestic compared with foreign salaries for occupations in which international labour mobility is significant (measures against " brain drain ").

Governments can play a decisive role in these matters. Firstly, they can adopt a general wage policy for industrial development that would provide effective means for channelling people to the required jobs. Secondly, governments are the main employers in many developing countries, and their wage-fixing practices might set a pattern for the private sector. Thirdly, governments may have a direct impact on wage and salary fixing in the private sector when arbitrating wage disputes and implementing minimum-wage legislation. In all these fields governments could foster rational structures of relative wages and salaries. Management-administered and collectively negotiated scales of remuneration for technicians and other categories of intermediate-level personnel could also follow the pattern of government practices for these categories, according to the priorities established for strategic manpower by an Industrial Training Organisation.

Reference is made to paper No. 8 below, particularly the pages which contain a discussion of some of the issues raised by a wage policy for industrialisation, as well as some of the instruments which can be used to implement it, i.e. minimum wage-fixing machinery and a system of job classification and grading.[1]

Other Measures.

Workers do not always react promptly to wage differentials between jobs; they may not be strongly influenced by information on occupations or by the existence of guidance and employment services. Some countries have, therefore, adopted other measures to make work more attractive in certain occupations, industries and regions, e.g. provision of adequate housing facilities, pension or gratuity schemes, and other amenities.

Hiring and promotion policies can also play an important role in the allocation of the industrial labour force. They should be based on sound principles of industrial and human relations and on adequate administrative practices, and should consider the objectives of the national strategy for industrial training and development and the proposed system of job classification and grading. Particular attention should be given to the establishment of sound recruitment standards at the plant, industry sector and national levels. In this respect, the work done by the proposed Industrial Training Organisation or by similar bodies in the definition of industrial occupations and their educational and training content, and by a trade-testing system to assess the performance of trainees, should help in improving recruitment policies in industry.

Other measures include the practice of " bonding ", i.e. requiring people to serve during a certain period in a certain job or occupation with a view to recovering part of the cost of their training. This would apply particularly to certain high-level industrial occupations, such as design and research engineers and scientists.

The problem of " brain drain " is of particular concern to many developing countries. The exact scope of this phenomenon and its cost to the country of emigration have not been fully ascertained. Nevertheless, many countries are taking measures to improve their pattern of incentives, both monetary and non-monetary, in order to keep qualified high-level manpower at home or to attract it from abroad. There is more to be done, however, in terms of incomes and of subsidies policies, for the categories of personnel concerned.[1]

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[1] For further information on the question of money incentives for industrial work see *Report on the World Social Situation, 1965*, op. cit., Ch. XI-XIII.

(c) *Measures Aimed at Improving the Performance of Industrial Manpower*

While a number of the measures mentioned above, such as those concerning wages and status, would also improve the performance of industrial manpower, other specific measures to this end need to be adopted. Improvement of general conditions of work, including better health and safety provisions, of the " environment " for industrial work, briefly discussed in the introduction to the present paper, and of personnel and industrial relations policies, are important in this connection. The following brief discussion centres on the improvement of the performance of industrial manpower through the rational organisation of industrial enterprises.

It is often overlooked that the upper limit of productivity of the worker on the shop floor has been very largely determined for him even before he starts his job. The production worker is normally the last link in a chain of activities which starts with design, marketing, purchasing, equipping and planning, and he can be only as efficient as these activities will allow him to be. Failure to realise this has led to the onus for high output largely being placed—or rather, misplaced—on the shoulders of the worker alone, whereas he has often been the victim of bad management. The factors affecting his performance are worth examining; they relate to excess work content and ineffective time.

Excess Work Content.

Every product may be considered as having an irreducible minimum time of manufacture which would be taken if all the conditions were absolutely perfect. The time to make a product or complete an operation under these ideal conditions may be called the basic work content, the term " work content " meaning the amount of work " contained in " the manufacture of a given product by a given process in terms of man-hours or machine-hours.[1] In general, the actual time of manufacture is far in excess of this ideal minimum.

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[1] For a more detailed discussion of the " brain drain " problem see *Report on the World Social Situation, 1965*, op. cit., Ch. XII.

The factors which cause this excess work content may be divided into two groups: first, those arising from defects in the design or specification of the product and, second, those due to inefficient methods of manufacture or operation: carrying out operations on the wrong type of machine; speeds, feeds or other factors being less than optimum; use of the wrong type of tool; bad layout of the workshop or factory; and bad working methods of the individual operative.

Each one of these defects tends to prolong the time which it takes to carry out an individual operation or complete a given product. The various conditions imposed upon the worker cause him to do more work than he need do and are almost wholly outside his control. Even his bad working methods may be due to bad workplace layout or lack of the proper training which it is the duty of the management to give him if he is to achieve a reasonable level of productivity.

Ineffective Time.

Ineffective time, that is the time during which a worker (or a machine) is not working at all or is carrying out work which will subsequently not be sold, may be due to shortcomings of the management or of the worker. Many factors that can bring about ineffective time are outside the control of the worker, such as too great a variety of products, causing constant changing of tools and stopping of machines; changes in design; bad planning of the flow of work; plant or equipment badly maintained and constantly breaking down; and bad working conditions demanding breaks for rest which would not otherwise be necessary. Accidents cause considerable loss of time, not only to the victims themselves but very often—and to a far greater extent—to supervisors and others associated with them. Ineffective time may be caused also by the workers idling, being absent without leave or causing accidents through disobeying instructions.

Many modern management techniques[2] have been developed for reducing excess work content and ineffective time. It is not possible in this paper to discuss in depth any one of these management techniques. Measures to reduce excess work content include improved design for producibility, standardisation of components, and proper setting of quality standards. Process planning, method study to eliminate wasted movement and effort, plant layout, ergonomics and related techniques, can contribute to reducing excess work content due to faulty methods.

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[1] See I.L.O.: *Introduction to Work Study* (Geneva, 1966), p. 17.

[2] For a definition of a " management technique " see *Introduction to Work Study*, op. cit., p. 26.

Ineffective time can be reduced by better planning and control of production, the analysis of sales to reduce unnecessary variety in the products manufactured, and preventive maintenance. Improvements can also be made in working conditions, lighting and air-conditioning, and appropriate safety training can be given. Finally, ineffective time for which the workers themselves are responsible can be reduced by better supervision, personnel practices and industrial relations, as well as by positive incentives for attendance and output.

In this way the productivity of labour can often be more than doubled at little cost. The productivity of skilled labour can be greatly increased if individual jobs are broken down and the elements for which skill is essential separated from those for which it is not; in the repair of electric motors, for instance, dismantling and reassembly of the non-electrical parts can be done by labourers, leaving the skilled electrician to work only on the electrical parts.

High-level manpower can be economised in the same way as skilled workers, that is by ensuring that the functions not requiring special knowledge are performed by people with lesser qualifications. It is significant that " scientific management " evolved in the United States in the 1890s because of the shortage of skilled supervisors, which led to the breaking down of total supervising, planning and control functions so that individual functions could each be carried out by someone less skilled. It must be added, however, that in order to deal with the greater number of individuals involved and to co-ordinate their work, higher management must be better than formerly.

Other Important Aspects of Organisation of Enterprises.

A more rational organisation of industrial undertakings may include measures such as intensive staffing and shift work. Although discussed in another paper, these measures should be mentioned here, in view of their effects on industrial performance. Examples of the applications of these measures, e.g. in Japan, show that management can take advantage of the availability of unskilled and skilled manpower to organise production in a way that makes the optimum use of existing equipment. The production process can also be adapted to the pattern of available skills. Very careful process planning, work study and production control are needed to ensure the success of these methods.

Another important aspect is the efficient organisation of basic and further training in the enterprise, for all levels of industrial manpower (including senior staff and management). This aspect, discussed in paper No. 2, is a powerful instrument for improving the performance of staff.

Incentives to Stimulate Performance.

Most of the incentives to channel people to industrial training and industrial work also contribute to increasing work performance. They fall into two classes: *financial incentives* in the form of adequate basic wages and salaries, with or without various types of bonuses, and fringe benefits such as low-cost housing, medical benefits, education for children, co-operative purchasing and credit facilities, and so on; and the *non-financial* or *psychological incentives*, including sound personnel policies, favourable social climate in the enterprise, etc.

Another aspect of financial incentives is that of payment by results, especially piece-work. This form of payment " is among the oldest ways of rewarding work ". It would appear, however, that as economic development proceeds, the scope for piece-work diminishes both as regards the proportion of the labour force affected and the proportion of piece-workers' earnings directly related to output. The reasons for this trend are to be found " in certain intrinsic limits beyond which piece-work cannot be rationally applied, and in certain costs and other inconveniences that it entails ". The case for piece-work in developing countries may well be stronger in view of the relatively greater importance of material as compared with social needs, and the nature of the industrial tasks typically performed in a developing economy. A piece-work incentive scheme, however, cannot be expected to compensate for the deficiencies of poor management or to offset the inhibiting effects on motivation of other factors.[1]

II. INTERNATIONAL ACTION

International organisations, particularly the I.L.O., have undertaken a number of activities—standard-setting, action-oriented research and technical co-operation—in order to help the developing countries in a variety of fields mentioned in this document. It would seem, nevertheless, that these activities (with the exception, perhaps, of management development projects), either have not had a sufficient impact—possibly because many factors bearing on the improved utilisation of industrial manpower are interconnected—or have not been given a high enough priority in the programmes of these organisations or in the requests from developing countries for technical co-operation.

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[1] For a more detailed discussion of this topic see *Report on the World Social Situation, 1965*, op. cit., Ch. XIII.

More vigorous international action in selected fields might greatly enhance the value of the developing countries' programmes for effective utilisation of their industrial labour force. A list of the most important of these fields—with some specific suggestions for international action—follows.

The following priority measures are suggested to deal with the long term, namely ensuring that a sufficient number of suitable people acquire the needed industrial skills:

(a) developing vocational guidance and counselling work for industrial manpower (principles to be applied for accelerated industrialisation, standards, techniques); particular attention should be given to vocational guidance for high-level industrial manpower and for selected strategic occupations; model schemes of co-operation between schools and vocational guidance services should be established; assistance should be given in the preparation of occupational monographs for particular groups of countries; techniques of gathering systematic information on industrial occupations might be developed;

(b) raising the status of industrial work (study of methods to achieve this; assistance in the organisation of national and regional production or productivity competitions; research on social and cultural obstacles to industrial work and on ways to promote key industrial occupations, such as managers);

(c) improving the selection process (research on selection techniques, aptitude-testing, particularly for high-level or strategic industrial manpower).

For the medium term, that of allocating and reallocating the industrial labour force between industries, regions, occupations and enterprises, the following measures are suggested:

(a) establishing or developing wages policies and machinery for their implementation (see paper No. 8 below); particular attention should be given to the question of minimum wage-fixing machineries and systems of job classification and grading; international studies on wage differentials for industrial work might be undertaken;

(b) improving employment market instruments; the role of employment services for industrial development and the scope and impact of active manpower policies should be investigated; assistance in the establishment of occupational registers;

(c) improving recruitment and promotion policies; particular attention should be given to the establishment of adequate recruitment standards (work in this field should be linked with activities on work study, job classification and grading, and trade testing);

(d) improving labour-management relations within the undertaking; practices should be reviewed in the light of the various problems bearing on the effective utilisation of industrial manpower;

(e) remedying adverse effects of the " brain drain " (research on the scope, impact and remedies).

Finally, for the short term, namely improving the performance of the industrial labour force, the following measures are suggested:

(a) nationalising the organisation of industrial undertakings of all sizes (research on management techniques to cope with excessive work content and ineffective time, on alternative staffing patterns based on different occupational structures, on shift work and on the best organisation of basic and further in-plant training; assistance to industrial undertakings in improving organisation);

(b) developing optimum patterns of incentives (research on the combination of financial and non-financial incentives for industrial manpower, including management; research on the applicability and impact of piece-work).

It is recommended that studies of the various problems mentioned above should be undertaken in connection with international technical co-operation activities in the fields of manpower assessment and planning, educational planning, management development, vocational training, vocational guidance, employment services, wage policy and industrial relations. The conclusions to be drawn from such studies would be particularly useful for the national Industrial Training Organisation proposed in paper No. 2 above.

4. TRAINING FOR SMALL MANUFACTURING ENTERPRISES IN DEVELOPING COUNTRIES

INTRODUCTION

Paper No. 2 above analyses the policies and practices of human resource development for industrialisation in developing countries; it deals with the fundamental issues underlying the mobilisation of manpower and with policies that public authorities should pursue to provide manufacturing enterprises with skilled personnel at all levels and is therefore not concerned with the effects that differences in the size of establishments may have on training. The present paper attempts to focus attention on a number of problems peculiar to small-scale manufacturing undertakings in developing countries, in so far as they will influence the design and execution of training programmes to raise the entrepreneurial, managerial and technical skills of small industrialists as well as shop-floor operators.

The need for a single individual to perform a variety of functions for which specialist personnel are available in large enterprises creates for the small industrialist a pattern of work quite different from that of the director of a large establishment. This will obviously have an impact on the respective attitudes and skills required for the effective performance of functions in the two sectors and the manner in which the process of skill formation for either will be designed and organised. Equally, the scale on which production in small manufacturing enterprises is carried out will determine the type of production know-how and technical skills required for their operation. In developing countries especially, the low level of applied technology as a distinct feature of the small enterprise will affect the scope and content of technical training programmes. These and other factors justify special attention being paid to the question of training small-scale industrialists.

For the purpose of this paper, small industrial enterprises are defined as establishments for manufacturing, processing and servicing (installation, maintenance and repair). They differ from large undertakings by a significant lack of specialisation in the entrepreneurial, managerial and technical functions. Such small undertakings range from handicraft and cottage industry establishments in which the owner works together with his family to artisan workshops employing hired labour and using simple tools and equipment and the mechanised factory which may employ up to 100 workers. The common denominator between them is that a single working proprietor or manager has to exercise all the entrepreneurial, technical and managerial functions himself, with the help of one or two staff, such as a shop-floor supervisor, a book-keeper or a salesman, at the most.

This paper is divided into two main parts. The first deals with the subject of training small industrialists in the skills they require to discharge their entrepreneurial and managerial functions effectively and to perform certain specialist tasks of a non-technical nature which, in a greater or lesser degree and depending on circumstances, the small industrialist has necessarily to carry out unaided. Training related to all questions of production technology, including operative skills in manufacturing techniques for both working proprietors and workers, is examined in the second part. While technical training questions are examined not only in relation to the small industrialist for whom the training is designed, but also as they affect the pattern of work of the workers on the shop floor, the question of entrepreneurial and managerial training is approached from a more limited, strictly personal point of view, as it has necessarily to be focused entirely on the small industrialist. Finally, a few concluding observations are made.

I. TRAINING SMALL INDUSTRIALISTS IN ENTREPRENEURIAL AND MANAGERIAL SKILLS

The Nature of the Small Enterprise

For a clear understanding of the subject of skill formation of small industrialists, it is desirable first of all to get an appreciation of the persons involved, the tasks they perform and the difficulties they encounter when operating their enterprises. The growth of modern industry in developing countries, and in particular the introduction of manufacturing activities that constitute a technological break with traditional handicraft industry, has given rise to the emergence of small industrialists whose origin may be traced back to a diversified entrepreneurial background. In most of these countries, small manufacturing enterprises are established by—

(*a*) skilled artisans, such as the village blacksmith and carpenter and the urban motor repair man who combines technical skills, rudimentary business talent and small savings that enable him to expand his workshop gradually into a small manufacturing unit; it is specially in such trades as metal and wood work and tanning—trades characterised by piece and batch production, where the " financial threshold of entry "[1] into small-scale industry can be rather low—that small factories emerge from the handicraft sector;

(b) merchants who are familiar with the marketing function in industry, and who are generally aware of the opportunities for profit which are the reward of domestic production of consumer goods as an alternative to importation. This group is particularly active in the processing industries, such as soap manufacture and textile weaving, which have a low-to-medium financial entry threshold and do not require great technical know-how for successful operation;

(c) landlords and farmers with large holdings, including rural traders who control agricultural output and/or trade and who are frequently engaged in agricultural processing industries such as grain-milling, oil-pressing, cotton-ginning, logging and sawmilling; these industries require a good understanding of produce marketing but rather modest investment and limited technical knowledge;

(d) a very heterogeneous but far from negligible group: retired civil servants and members of the armed forces with administrative experience and leadership talent; young graduates of technical schools who establish themselves as independent small businessmen, particularly in the modern skill-intensive and technologically progressive industries (such as precision engineering); skilled workers and foremen in large factories with some savings and a desire to branch out on their own; educated persons with a rather specialised technical knowledge (such as pharmacists) that can be profitably invested in small processing units (including the pharmaceutical and toiletries industries).

This brief summary indicates considerable variety in background and experience of those establishing and operating small enterprises. For many small industrialists, experience accumulated prior to joining the small-scale manufacturing sector relates to technical skills; they do not, however, possess the required complement of marketing knowledge. Others may be experienced in marketing operations, though such experience is not always an appropriate preparation for successful management of an industrial establishment. Others still, with a civil service or military background which has familiarised them with general organisation, may have no business acumen. Some groups, like urban merchants, are likely to welcome innovation and change, while small industrialists emerging from the traditional artisan sector are generally more conservative in outlook. This peculiar pattern of entrepreneurial origin, and the corresponding imbalance in knowledge and skills, will naturally influence the design of training programmes for small industrialists.

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[1] The amount of money required to establish an industrial enterprise of minimum economic size. Obviously, the financial threshold of entry varies considerably according to manufacturing activity. While in developing countries the establishment of a small but adequately equipped automotive maintenance and repair shop may require the investment of as little as United States $5,000, approximately $1 million has to be invested in a new cement plant of economic size; such investment amounts naturally create an effective barrier to participation of small entrepreneurs in the latter type of manufacturing activity.

The very nature of the small enterprise further complicates training. A small enterprise has its own peculiar structure; it is not a reduced model of a large enterprise. No functional specialisation is possible, neither are the functions of the working proprietor comparable to those of the managing director of a large firm, even though the small entrepreneur also has to plan, organise and control. While he must deal with questions requiring thorough technical knowledge—for instance the choice of equipment—he cannot be compared with the works engineer who specifies equipment for a large enterprise. The training and motivation of employees of a small enterprise also require a different approach. The small industrialist, therefore, has to assume many—sometimes conflicting—roles, which would seem to fall into four broad categories.

Firstly, the small businessman is an investor earning an income, and ultimately a profit, from his business. While a shareholder may have a relatively detached attitude towards operations in a business venture, the private and occupational life of the small industrialist is often directly influenced by investment decisions.

Secondly, he will generally possess to a greater or lesser extent certain entrepreneurial qualities—energy and drive, physical stamina, willingness to take risks, and a strong desire for independence. Those abundantly endowed with these qualities will be interested in the growth of their businesses; those less endowed, in maintaining operation at a level which provides them with an adequate income.

Thirdly, the working proprietor is the person who manages the enterprise and who plans, co-ordinates and controls operations. This management function is very rudimentary in a small establishment: essentially, management is the art of getting things done through people, and obviously, an enterprise operating with only a few workers leaves limited scope to exercise the managerial function. When, however, the enterprise grows in size, management becomes an increasingly important activity which, in very large enterprises, requires the full-time attention of those in charge.

In the fourth place, there is what might be called the question of the specialist function. Because of the absence of functional specialisation in the operational activities of a small enterprise, the working proprietor is engaged in a number of activities which require a greater or lesser degree of specific knowledge and skill for their effective execution. By far the most important of these activities is the one related to all questions of production technology, ranging from a general understanding of the manufacturing process in which the enterprise is engaged to the ability to carry out specific operational tasks on the shop floor. The working proprietor is also directly concerned with buying and selling, financing and managing his money and maintaining accounts and other records. These activities, which in larger firms are carried out by specialist staff, are inseparable from management.

The effective performance of so many, often conflicting, roles by one man requires a balanced view of priorities. For instance, the craftsman in him may resist a lowering of the quality standards which his sound management thinking knows is the only answer to declining profit margins. He must concentrate on several functions at the same time, in both the long and the short term. If he wants to adjust to changing conditions he may have to select, install and test new equipment and plan the instruction and training of personnel to work this equipment, while at the same time carrying out routine tasks such as quality control, scheduling, maintaining relations with suppliers and customers, and having consultations with government authorities. He must give attention to each aspect in the proportion in which it is necessary. It is the difficulty of balancing these activities which is the basic restraining influence in the growth of small enterprises. In any training programme for small industrialists, therefore, the question of priorities and the balancing of tasks must be given a great deal of attention.

It would appear that three variables basically influence the nature, scope and intensity with which the small industrialist carries out his functions.

The first variable which affects this activity is the nature of the manufacturing process. Some processes require the active and continuous participation of the proprietor in all questions of technology, while others more or less run themselves and the emphasis is on marketing. The first group includes engineering, where the technical function looms large in the activities of the small industrialist. On the other hand, in industries such as flour-milling, oil-pressing, sawmilling and cotton-ginning, success depends rather on commercial skills.

The second variable is the size of the enterprise expressed by one or more factors—number of employees, capital invested, power, production value, volume of turnover—which, coupled with applied technology, is probably the most important factor influencing the work pattern. The following broad subdivision of the small enterprise sector may place this question of size in perspective:

(a) household manufacturing undertakings (less than ten persons per unit) located in or near the home of the skilled craftsman/owner, who works on the shop floor and whose main objective is to earn a livelihood;

(b) pre-factory enterprises situated near the home of the technically skilled owner, whose main objective is to earn a living but who is beginning to think in terms of profit rather than income; there is a rudimentary division between technical production and other activities;

(c) small-scale factories (30 to 100 persons per unit) where the proprietor is increasingly concerned with obtaining maximum profits, and where, although he is very much involved in techniques of production within the limits of the technology, it is entrepreneurship and management which dominate the successful operation of the enterprise.

Thus, in a firm which is moving up this scale, the proprietor's pattern of work is affected by his changing role in the undertaking. In a small establishment which is expanding, he will generally devote an increasing proportion of his time to planning, co-ordinating and controlling operations. The growth of the enterprise will change him from a technician with managerial responsibilities into a manager with technical responsibilities. As operations expand still further, the firm is prepared for subsequent growth into a medium-scale establishment by the emergence of a management structure.

The third variable which influences the functions of the working proprietor is the business environment. In a developed country the owner of a small enterprise benefits from a highly developed system of infrastructural facilities and services. He is assisted by specialised trade associations, by industrial supply firms who provide technical advisory services to clients, by institutions accustomed to dealing with people of modest financial means, and by numerous public and semi-public agencies whose sole purpose is to relieve him of certain operational responsibilities and to help him participate effectively in the economic life of the country. For example, by paying a small fee he can obtain management control data without having to specialise in this or to engage a highly paid employee to do so. This network of supporting facilities is denied the small industrialist in a developing country, where the economic organisation is inadequate.

Summarising, it would appear that a number of variables determine on the one hand what skills the small industrialist in a developing country requires in order to work effectively, and on the other what skills he brings with him when entering the manufacturing sector. To operate a small enterprise he needs technical, commercial, financial, administrative, entrepreneurial and managerial knowledge, and the extent to which he uses these skills effectively will depend on the nature and size of his manufacturing activity, and on the infrastructural facilities and services available. Further, unlike his counterparts in industrialised countries, he has to cope with the additional burden of a low level of applied technology. Finally, problems arising from operations carried out on a small scale cannot be solved by raising the levels of skills of those concerned; the solution lies rather in building up institutional facilities which encourage mutual support between small and large enterprises. All these factors call for an imaginative, highly diversified and flexible training programme for small industrialists.

Current Training Practices

Like so many other training programmes, those specially designed for the systematic development of entrepreneurial, managerial and other non-technical skills have, in fact, started in the developing countries only since the Second World War with the establishment of an increasing number of industrial development institutes and productivity and management training centres, partly with assistance from the International Labour Organisation and the United Nations Development Programme (U.N.D.P.). Courses offered by these institutions, for managing directors down to first-line supervisors, are generally designed to meet the training needs of personnel already engaged in all types and sizes of enterprises and deal not only with general management subjects but also with such techniques as production planning and control, marketing, accounting and personnel management. Very little provision is made for advisory or extension services after the completion of courses, although centres established with I.L.O. co-operation emphasise the intrinsic need for in-plant training, and much of the training is " quality-oriented ", with the aim of upgrading the skills of specialised personnel such as works engineers and accountants. Such courses are frequently supplemented by " problem-oriented " training programmes dealing with such common problems as labour-management relations, staff training, communications within the enterprise and interpretation of statistical information.

This emphasis on specialist training is particularly useful for professional managers and technical and administrative personnel employed in larger enterprises with a functional management structure; its usefulness is, however, progressively reduced when it is applied to smaller enterprises where small industrialists together with their few assistants invariably carry out a number of tasks for which the larger enterprise has specialised staff at its disposal. Moreover, the organisation of training programmes for small industrialists raises a number of problems which are significantly different from those generally encountered when management development programmes for personnel employed in larger enterprises are being designed. A recent I.L.O. meeting [1] has identified some of these problems as follows:

(a) lack of interest in, and lack of appreciation of, the value of training;

(b) low level of basic education;

(c) extremely wide variety of technical subjects to be covered, together with a wide range of levels at which business management and technical training are needed. This militates against the adoption of a common programme and requires a wide range of teaching skills;

(d) difficulties encountered by small entrepreneurs in leaving their enterprises in order to attend training courses held during working hours some distance away;

(e) lack of funds to pay for the cost of training; even if training is provided free of charge, expenses for travel, board and lodging while attending institutional courses may be a burden; even if funds are available, the small entrepreneur may be reluctant to spend money on training which, to him, has an intangible value;

(f) lack of local training personnel in the numbers needed, those that are available often having inadequate knowledge;

(g) the high cost of providing institutional training on such a variety of levels and subjects.

In the latter part of the 1950s several countries, particularly in the Asian region, realising the difficulties experienced by existing industrial development and management training institutes in running courses for small enterprises, set up special programmes for training in entrepreneurial, managerial and technical skills, often with U.N.D.P. and I.L.O. assistance. As far as possible, training—usually in the form of free evening courses—is organised for each manufacturing activity in such public agencies as small industry service institutes offering an integrated system of research, training, and advisory and extension services. In addition to courses considered useful for small plants, such as inventory control, work study and cost accounting, courses are frequently held to upgrade skills or to introduce small industrialists to new manufacturing equipment and processes and to inform them of government policies and plans for the small industry sector (loan and credit facilities, provision for modern workshop space on industrial estates).

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[1] *Conclusions on Small Enterprise Development in Africa,* I.L.O. Technical Expert Meeting on Development of Managerial and Entrepreneurial Resources in Africa, Addis Ababa, December 1966, document Man.Dev./Africa Meeting/33 (mimeographed). While this Meeting examined the question of training problems for small industrialists in relation to Africa, most of its conclusions are relevant to developing countries at large.

With a few exceptions, training courses for small industrialists in developing countries would seem to suffer from two defects: firstly, they are, by and large, " miniaturised " versions of those designed for management personnel employed in larger enterprises or are " rehashed " material taken from courses prepared in industrialised countries; and secondly, insufficient attention is given to relating the course material to the operational requirements of a particular manufacturing activity. The effectiveness of such training efforts is therefore reduced, particularly since very little literature exists on operational practices, structure, needs and stages of development of small industries in developing countries, and on the effects of given production technologies on operational arrangements in such enterprises. This area presents a wide field for useful research in the interest of the design and execution of training programmes for small industrialists.[1]

Guidelines for Training

The previous analysis of the nature of small manufacturing enterprises and the problems they are facing in developing countries would suggest a number of guidelines for the design and execution of training programmes for working proprietors. They may be briefly summarised as follows:

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[1] Useful material, such as case histories, describing specific operational practices in small enterprises in developing countries, is being collected by various small industrial development agencies that operate in collaboration with the I.L.O.; arrangements are currently being made to collect, classify and interpret this case material for the preparation of an authoritative handbook on management practices and training needs of small industrialists in developing countries, to be published as a companion volume to *Services for Small-Scale Industry*, Studies and Reports, New Series, No. 61 (Geneva, I.L.O., 1961).

(a) Training of small industrialists demands a comprehensive approach to assist them both in developing the attitudes required to cope effectively with problems of change and growth and in upgrading their business skills. To this end, three main training methods should be employed: classroom instruction, field observation, and training within the enterprise.

(b) To be fully effective, training should be supported by programmes to raise the general educational level of the small industrialist so that he may better understand the environment in which he works, the social, economic and technical forces to which his enterprise is subjected, and the contribution he may make, alone or in co-operation with other small industrialists, to the progress of his business; adult education programmes, adjusted for the purpose, may be suitably applied.

(c) Given the generally low educational level, most small industrialists will find it difficult to translate abstract concepts explained in the classroom into practical action in their enterprises. Training programmes should therefore make ample use of modern methods imparting knowledge in small, graduated steps, at each of which the trainee can check whether he has absorbed the information before proceeding to the next. Use should also be made of visual aids of all kinds, situations experienced or witnessed rather than simulated; on-the-job training, group visits, in-plant training exercises, marketing clinics and other forms of training by participation are preferable to desk study.

(d) As far as practicable, instructional staff should be recruited from specialists working in industry, as such persons will bring to the programme an understanding of business operations which professional teachers seldom possess; brief teacher training courses may be organised to develop the required instructional and pedagogical skills.

(e) Ideally, all training programmes should be designed around a single manufacturing activity, in order to integrate a variety of skills into a single operational tool. In this way the small industrialist is better able to see the interrelationships between various terms with which he is familiar. Further, this approach will provide the small industrialist with a better understanding of how critical a factor is interplay of commerce and technology. For instance, he will see how production processes affect commercial practices and how advanced production techniques may increase the profitability of the enterprise.

(f) Advanced entrepreneurial and managerial skills can make their full contribution to the progress of the enterprise only if reinforced by other measures taken to promote the undertaking, such as the intro-

duction of modern equipment, joint action between small enterprises to benefit from economies of scale, and, in general, government measures to create an environment that is conducive to the development of small enterprises. Therefore, training should not proceed in isolation but should be designed as an intrinsic part of an over-all effort to develop one particular manufacturing branch. In this way the effectiveness of certain promotional measures will be enhanced: for example instruction in elementary accountancy, including the preparation of financial statements required by banking institutions, can be turned to account when a loan scheme for small industrialists is initiated.

(g) The preparation of training programmes should begin with systematic research into current operational practices in the small industry sector. Groups of small enterprises engaged in similar manufacturing activities should be studied with a view to—

(i) identifying the technical, economic and managerial problems facing the enterprise, and assessing what measures should be taken to develop the manufacturing branch as a whole;

(ii) determining what changes should be effected in the current pattern of management practices, and what additional skills the small industrialist needs to make operations more effective;

(iii) designing a suitable training programme, including the selection of the most effective training method, having regard to the educational level and previous experience of the trainees.

(h) Training programmes should come up for revision at set intervals so as to determine what course material has become superfluous or has to be replaced because of developments in the manufacturing branch concerned; particular care should be taken to omit information that is not directly relevant to the operational needs of the enterprise so as not to burden the small industrialist with knowledge that he cannot actually apply in his undertaking.

(i) All training programmes initiated by public authorities for the promotion of small enterprises should be carried out in close co-operation with associations of small industrialists and representatives from industry and the manufacturing branch concerned, so as to determine the effectiveness of the programmes and the changes which should be effected. Since this training should ultimately be carried out by the trade associations themselves, with the co-operation of the public authorities, the formation of such associations should be actively promoted, possibly through a suitable system of incentives.

(j) Training should have three broad objectives:

(i) to prepare enterprising persons who wish to participate in manufacturing industry in a proprietary capacity in the knowledge and skills they need for the successful establishment and operation of their business;

(ii) to raise skills of existing small industrialists so as to enable them to fully utilise the resources available to their enterprises; and

(iii) to assist small industrialists with growth potential to achieve a rational expansion of their enterprises.

(k) Training programmes to prepare potential small industrialists should start at school—in technical and vocational training institutions. They should be organised in close co-operation with the public agency responsible for the promotion of small enterprises and should aim at giving the students an understanding of the responsibilities of the work and a chance to see at first hand under expert guidance actual operational practices, both the handicaps and the advantages, in a small enterprise. They should also grasp the elements of procedures to establish new enterprises, such as obtaining sufficient finance; selecting and procuring equipment; supplies and materials; and making appropriate marketing arrangements.

(l) Training for prospective small industrialists may proceed in two stages:

(i) short appreciation courses to provide an understanding of the nature and major aspects of an enterprise, and the operational skills required for its successful management; such programmes, not necessarily designed around a single manufacturing activity, may help a prospective small industrialist to avoid mistakes frequently made by inexperienced persons, such as starting out with insufficient operational capital, or without acquiring the necessary technical knowledge;

(ii) courses of longer duration to prepare prospective small industrialists for their future task, preferably organised for a single manufacturing branch. Ideally, courses should be divided into two distinct periods: the first prior to establishing the enterprise, and the second during its initial operation. During the induction period, trainees should receive instruction in entrepreneurial and managerial skills, including, as necessary, specific technical and administrative skills. During the second period trainees established in business will bring to the classroom their day-to-day problems; these will be examined, solutions offered and, where necessary, additional theoretical instruction given to fill the gaps. This phase should particularly emphasise the application to the trainees' situations of theoretical instruction imparted during the first part of the training programme, ample use being made of in-plant training exercises.

(m) Training to enable existing small industrialists to fully utilise resources available to them may proceed in three stages:

(i) programmes organised, preferably in small groups, to familiarise small industrialists with modern entrepreneurial and managerial skills, using the self-education process of discussion of common problems and possible solutions under expert guidance;

(ii) sufficient interest having been stimulated in modern entrepreneurial and managerial skills, working proprietors and responsible staff of comparatively larger enterprises in the small industry sector would be further trained by specialised courses dealing with operational, administrative, technical, financial and commercial questions, wherever possible drawn from their own experience; they should also be given expert help in applying newly learned skills to their own enterprises;

(iii) small industrialists should undergo periodic refresher courses designed to give them the information needed to adjust their enterprises to new developments in technology, management and general operational practices.

(n) Training of small industrialists who operate enterprises with significant growth potential should concentrate on identifying and eliminating bottlenecks and on preparing for the expansion of the enterprises by teaching skills necessary for managerial, as distinct from technical, functions. Field visits to larger establishments, organised on lines similar to circuit schemes, often help to broaden outlooks.

(o) Consideration might be given to setting up and operating along commercial lines, in association with the public authorities responsible for training, a " model enterprise " where small industrialists can observe and practise management skills in day-to-day operations. Such a set-up would also provide teaching staff with the opportunity of carrying out action-oriented research.

(p) The utility of the " model enterprise " can be enhanced by organising it as a " training enterprise " which, in addition to setting an example for observation and study, will also provide facilities to train

new small industrialists and upgrade existing ones. Modern apprenticeship training methods for technical skill formation could be integrated with on-the-job training and related classroom instruction in entrepreneurial and managerial skills. Further details of the functions which a " training enterprise " might perform are given on page 147 below.

Practical Applications: Integration of Managerial Training

As suggested earlier, entrepreneurial training efforts are likely to be more successful if conceived and implemented as an intrinsic part of an over-all plan of action to develop the small industry sector. The lack of an integrated approach is probably the most serious, widespread and persistent problem facing public efforts to develop small enterprises. For instance, new enterprises may be actively encouraged, while no provision is made for the steady flow of raw material, and credit schemes may be frequently initiated without appropriate guidance on how to invest the borrowed money wisely. In turn, lack of knowledge of the operational practices of the small industry sector and the absence of organisational machinery to consult small entrepreneurs on the preparation and execution of public policies and programmes being designed in their interest, lead to disappointing training results, frustration among entrepreneurs owing to badly timed action, and their subsequent distrust of the efficacy of publicly sponsored training schemes.

When attempts are made to develop a nation-wide, integrated system of promotional services to assist all types of manufacturing enterprises, irrespective of size or location, so many administrative difficulties arise that a more effective approach might be training for groups of enterprises, by geographical area and identical business and technical interests. Those responsible for such training, together with an interested group of small industrialists, would plan and execute enterprise group training programmes within the framework of the industry group as a whole. This would call for a number of different kinds of investments—human, material and institutional, preferably expressed in quantitative terms—which would yield predetermined output targets within a specified time. To ensure the effective utilisation by industry of the means at its disposal, special planning, co-ordinating, motivation and control systems would have to be developed so that the quality and scheduling of the programmes would ensure the attainment of targets such as the creation of new employment.[1]

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[1] A model for such planning and control systems may be found in the operational practices of large multinational corporations that control a number of geographically dispersed manufacturing establishments.

While the most important contribution in human terms would undoubtedly be that of raising levels of skills of small industrialists and workers alike, the corresponding institutional measures would determine the organisational form of training programmes, which could, for example, be carried out by co-operative training societies. The advantages of such an integrated training approach to small enterprise promotion are evident. For instance, integrated training in improved foundry techniques would reduce wastage of raw materials frequently requiring the outlay of scarce foreign exchange resources. (Funds formerly tied up in stock would thereby become available for other more productive purposes; this, in turn, will require training in financial management and the rational selection of investment alternatives.)

Finally, the concept of the " training enterprise " mentioned earlier might be particularly useful in countries in the early stages of industrial development and lacking a craft tradition, including countries in Africa south of the Sahara. There special " live situation " programmes would be required to train small industrialists in entrepreneurial and managerial skills and modern production technology. This might be done by establishing, as part of the industrial development programme of the country, " training enterprises " with adjoining training bays, each catering for one specific manufacturing sector and operating as a bona fide commercial undertaking with its own capital and profit-and-loss account. Responsibility for keeping losses to a strict minimum and running the training-cum-production centre would be vested in an instructor.

The courses would reproduce traditional European apprenticeship arrangements, providing integrated on-the-job training in both the technical and managerial aspects of the enterprise. Each trainee—selected according to set minimum requirements regarding technical qualifications and experience—would work in a " training enterprise " with people of closely related interests under the close guidance of the instructor. The programme could be based on the actual tasks and functions of the owner-manager in the particular branch of activity, the length of the training period varying accordingly; trainees would assume in turn the role and functions of the working proprietor, including administration, record-keeping and costing. Supplementary classroom instruction would be given in the training bays. At the end of the training period—which might last up to two years—the graduate would be assisted to establish himself as a small entrepreneur, possibly on an industrial estate so as to facilitate the follow-up provided by the government extension service. In this way, he would have the benefit of continuous advice and guidance as well as common technical and service facilities to help him operate his undertaking efficiently and profitably.

II. THE TECHNICAL TRAINING OF SMALL INDUSTRIALISTS AND WORKERS

The Present Situation

On-the-job training is, by and large, in industrialised as well as in developing countries, the main method through which workers acquire the knowledge and skill necessary for effective participation in the manufacturing industry. Such training is normally supported and reinforced by technical schools and vocational training centres, particularly with regard to occupations with a high skill content like those concerned with the metal and electrical trades. In these institutions young people are introduced to basic industrial skills prior to, or in conjunction with, receiving on-the-job training under actual production conditions in the enterprise. Training programmes are organised mostly along occupational lines; only in a few instances are training facilities designed around a particular technology to be applied in small enterprises as a distinct type of industrial organisation. In the developing countries training of the latter type is largely directed towards improving handicraft skills for the development of the pre-industrial manufacturing sector, such as handloom weaving and pottery. As regards the modern small-scale enterprise sector, isolated efforts are being made to raise levels of skills in certain occupations, normally in short supply, that constitute a bottleneck in the growth of small enterprises, such as training in blueprint reading, heat-treatment and metal-coating for the light engineering trades, chrome-tanning to supplement the traditional vegetable-tanning techniques, and the like. Promotional agencies like the small industry service institutes are particularly active in the latter type of training.

Notwithstanding the efforts of the public authorities in developing countries to expand technical training facilities in order to meet the increasing need for skilled personnel at the shop-floor level, the demand for such persons invariably exceeds the supply. Moreover, the training systems in these countries are conceived to serve the requirements of government technical departments, medium- and large-scale industry, and commerce. The same normally applies to the activities of the vocational and technical education branches of the educational system. In view of this it is not surprising that the existing training system hardly contributes to the progress of the small enterprise sector.

The low level of technology in the small enterprise sector further reduces the usefulness of the prevailing training system. Low levels of technology restrict earning capacity; invariably, therefore, wages, including fringe benefits, paid in large undertakings for selected occupations are appreciably higher than earnings of workers similarly engaged in small establishments; wage levels in large modern manufacturing complexes are often twice or even three times those found in small industrial units located in backward rural areas. Under such circumstances it is understandable that young workers on completion of their technical training, during which they are exposed to modern patterns of behaviour and thought, are most reluctant to spend their working life in small enterprises where earnings are low, working conditions, welfare facilities and social security coverage sub-standard, and opportunities for advancement under progressive management invariably limited.[1] Moreover, those few people who join a small enterprise will quickly discover that the level of applied technology does not provide them with the opportunity to exercise their skills because their previous institutional training has been related to technological practices and organisational methods prevailing in larger industrial undertakings. This will obviously lead to frustration and disillusion and to a desire to seek employment elsewhere.

In addition to getting trained personnel from the public training system, an increasing number of large-scale manufacturing enterprises in developing countries provide opportunity for new entrants to acquire skills or to upgrade them under special training arrangements within the undertaking. Such training is being organised in " training bays " or " vestibule schools ". These are training units, set up as an integral part of the enterprise, in which the equipment actually used on the shop floor is duplicated as closely as possible so as to provide training and skills actually needed in the undertaking concerned. Obviously small enterprises do not have the opportunity to establish their own in-plant training centres. They could, however, overcome this disadvantage by joining together and organising their training needs on a co-operative basis. Unfortunately, such co-operative training arrangements, which

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[1] In Japan, for example, the wage differentials, as measured by cash earnings according to the size of the establishment were as follows in 1961:

Number of workers employed	Wage index
500 and over	100.0
100 to 499	74.5
30 to 99	61.7
5 to 29	49.3

To some extent the wage differentials reflect the skill differentials implicit in the scale of operations. But detailed investigations have shown that the wage disadvantage of the employee of a small-scale undertaking is real. A Ministry of Labour inquiry in 1954 showed, for example, that in a rolling mill the wage index for a male roller aged between 30 and 35, with five to ten years' experience in the trade, would be 100 in an establishment employing 1,000 or more workers, but only 66 in an establishment are widely practised in Japan [1], do not exist in developing countries. This is due partly to an absence of effective joint action among small employers and between trade associations and vocational training centres located in the vicinity of the small enterprises; and partly to a lack of understanding of, and guidance in, matters of skill formation with special regard to the training needs of small industries under conditions of continuous and accelerated technological change.

As a result small-scale industry in developing countries still resorts to the age-old informal apprenticeship system whereby the worker learns the necessary skills and patterns and habits of work by observation, helping and imitating skilled operators until he has learnt to do all the jobs of the trade. Only in the very small enterprises and in the typically creative handicraft shop will the workshop owner, generally a skilled person himself, endeavour to systematically initiate in the skills of the trade members of his family when they join the enterprise, or young people specially apprenticed to him to learn the job. The informal apprenticeship training system no doubt performed a useful function in the past when levels of applied technology were largely static and when generation after generation of craftsmen used the same tools, equipment and materials to manufacture largely identical products for a traditional consumer market. The system is, however, becoming increasingly ineffective, for the workers have now to be prepared for productive employment in a dynamic society, characterised by rapid technological progress, by changing consumer preferences, and by newly evolving organisational patterns in commerce, trade and industry.

These informal apprentice-training arrangements have several limitations: they tend to perpetuate, rather than correct, defective and obsolete methods of work; they do not equip the young with the skills required to modernise the industry; and they do not contribute to standard performance in manufacturing. This latter disadvantage is particularly unfortunate since it hampers production arrangements mutually advantageous to both small and large enterprises, and places the small plant at a disadvantage when competing in non-traditional markets. The present informal apprenticeship arrangements must be reinforced and expanded by modern systems of education and training

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employing ten to 29 workers. These disparities are all-round and relate to economic and social conditions of workers in small-scale and large-scale enterprises: they cover not only wage levels but also working conditions, hours of work, security of employment, social security, and welfare levels. See I.L.O.: *Some Labour and Social Aspects of Economic Development*, Report of the Director-General, Fifth Asian Regional Conference, Melbourne, 1962 (Geneva, 1962), p. 68.

[1] Keiji SOEJIMA: " A Break with Tradition ", in *Training for Progress* (Geneva, I.L.O.), Vol. 3, 1963, No. 1, pp. 6-11.

if small industry in developing countries is to be rejuvenated by young, well-trained workers with new attitudes and skills.

Like the small enterprise workers, small industrialists are also at a disadvantage when compared with their counterparts in industrialised countries. They, too, generally lack systematic training and formal instruction in technical skills, since those with sound technical education prefer, for reasons already explained, to seek employment in other sectors. Those with an artisan background have the advantage of shop-floor experience, but they lack the education needed to upgrade themselves by independent study or other informal instruction. The absence of a technically well-educated class of working proprietors, apart from a small minority of graduates of technical schools, naturally inhibits rapid technological change in the small enterprise sector.

Technical Training Needs of Small Enterprises

When deciding what arrangements would be best suited to meeting the technical training needs of the small enterprise sector, a brief reference may be made to operational differences between smaller and larger enterprises.

In the first place, the workers in small enterprises must be versatile. In large establishments, especially those engaged in mass production, workers are obliged to work one machine set to perform a specific task. By contrast, the very nature of piece or batch production by the small enterprise leaves much to the workmanship of the operator, who may not proceed according to a predetermined schedule of operations and who often has to use several different machines in order to produce the finished article. Obviously, a worker who has to operate under such conditions should possess a wider skill range than the operator in a large engineering works performing only one job under continuous and close supervision. With this greater versatility should go certain corresponding human qualities, such as imagination and the ability to shift quickly from one operation to another.

In addition, because of the small scale on which operations are carried out, the small enterprise generally utilises, side by side, production technologies of varying degrees of mechanisation and technical complexity. To take an example from the small machine shop: while the nature and volume of work may warrant the purchase of a drilling machine, the volume of milling work may be too small for a separate milling machine, and a lathe may have to be fitted with additional accessories for the purpose.

The position is further complicated in developing countries, where technology varies not only within a single enterprise but also between small enterprises belonging to one manufacturing branch, and even more so between smaller and larger undertakings, where the gap in respective technological levels is wide. This gap is the result of a variety of factors. In general, capital is dear in developing countries; it is particularly so for small working proprietors who have limited access to institutionalised credit and who therefore have to avail themselves of informal credit arrangements at significantly higher interest rates; this will obviously restrict the introduction of modern and more expensive equipment. Additional factors that contribute to a low level of applied technology in the small enterprise sector include a lack of technical information and production know-how, lack of skilled personnel and, above all, the fact that most modern equipment available on the market is designed for use in industrialised countries with radically different resource endowments from those prevailing in developing countries.[1] In spite of all these limitations, it is perfectly feasible to introduce advanced technologies into small enterprises, but this will demand a far faster rate of skill development than did their gradual introduction over a longer period of time in larger enterprises. Thus, the carpenter in a developing country who manufactures furniture by joinery work and hand assembly will require substantial retraining when he has to operate more complicated equipment such as the combined chisel-and-chain mortising machine, or when he has to cope with veneer finishing instead of using brush and paint.

Further, technical training in the small enterprise sector is not limited to workers but will have to include small industrialists as well. To operate his enterprise efficiently the working proprietor has to possess, in greater or lesser degree, a profound knowledge of the technology in which his enterprise operates, as well as manual and operative skills; the extent to which such knowledge and skills are required will depend on the type of manufacturing activity and scale of operations. Moreover, in very small enterprises, the working proprietor may frequently have to join production on the shop floor if the scale of operations does not justify employment of a full-time technical specialist, or if he has to supplement certain operative skills lacking in his workers. While it may be sufficient for the working proprietor of a larger foundry to keep abreast of advances in foundry technology, the small proprietor often requires training in certain skills.

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[1] This question is examined in detail in paper No. 7 below.

There is a final important feature : the proprietor himself is generally responsible for training his workers for a continuously changing situation which demands new types of products and corresponding changes in applied technology. The need for, and implications of, accelerated change and adjustment should be understood not only by the working proprietor but also by his workers, so that everyone involved realises the necessity of co-operation in modernising the enterprise. The large establishment has ample opportunity to manipulate labour productivity successfully by selected organisational and managerial techniques and the utilisation of capital-intensive technologies. The small enterprise, however, if it is to continue to run at a profit, has to rely largely on the attitude and motivation, knowledge and skills of its working community, from the proprietor to the workers. Progress in the small enterprise depends essentially on social and technological change; while technological level is a critical factor for the future of small business, even more will depend on the personal initiative, the ability to adjust, the desire to innovate and to progress, the wish to learn new things and to abandon obsolete notions that will gradually lead to a more rational system of industrial organisation. To be really effective, a technical training programme cannot ignore the problem of developing in the working community of the small enterprise the attitudes necessary to turn advanced technical skills to the best account. This will require a training system that will blend technical instruction with personality development, which in turn will enable the working proprietor to carry out his training task in the best manner possible.

Guidelines for Training

The previous analysis of the current position would suggest that, in framing a national policy for technical and vocational education and training in support of industrialisation efforts, care should be taken to ensure that it meets the conditions and requirements not only of larger but also of smaller manufacturing industry. In the design and execution of training programmes, therefore, consideration might be given to the following guidelines:

(a) Technical training programmes for the development of small enterprises should be fully integrated in the training policies for both smaller and larger manufacturing industries. To ensure full and undivided attention to the training needs of the small industry sector, it might be necessary to establish one or more organisational units within the public authority—or authorities—responsible for education and training in both production and management techniques. Such units should be concerned primarily with providing counselling services to government

agencies for small-enterprise development and other public and private bodies, such as trade associations or co-operative training societies, in all matters of technical and managerial training for all levels of the labour force of small manufacturing enterprises.

(b) Technical training of working proprietors should be integrated with training in entrepreneurial and managerial skills in order to ensure that any large-scale public training effort should be initiated only when the owner of the small enterprise has been convinced of both the need and the advantage of technical training for industry; this will enable him to fully utilise higher levels of labour skills in his undertaking. Moreover, training schemes should provide the working proprietor with a full understanding of the interplay of management and technology and the contribution that a progressive technology can make to the profitability of the enterprise. In particular, they should provide him with essential advanced skills.

(c) Technical training for working proprietors, foremen and operatives should be designed to the largest extent possible around a particular manufacturing technology, rather than organised along occupational lines. This will not only create among trainees a common interest in the skills being taught but will also aid learning by reference to production processes with which they are familiar. In addition, it will increase their skill range and thereby contribute towards the technical versatility required for successful operations in a small establishment.

(d) Because the resources in terms of funds and specialist manpower required to design and execute such training schemes are necessarily limited, priorities should be established firstly as to the manufacturing branch or branches to which training efforts should be particularly directed, and secondly, as to the sizes and types of enterprise that are likely to benefit most from public training programmes.

(e) Under conditions where the demand for skilled personnel exceeds the supply by a wide margin, and where larger enterprises will command a premium over small establishments when employing workers with adequate vocational preparation, it is unlikely that the normal education and training system will contribute in significant measure to raising skill levels in small industry. Technical training efforts, therefore, should be directed primarily to training workers already employed in small industry, rather than providing vocational preparation for new entrants to the labour force, who will continue to find employment in large manufacturing industry. The success of publicly sponsored training programmes for employed workers will largely depend on the direct and

visible contribution that higher skills can make to the productive efforts of the small industrialists who are required to participate in them.

(f) Since on-the-job training without vocational preparation will remain for years to come the machinery for technical skill formation in small industry, training programmes should aim at gradually reinforcing and completing the traditional informal apprenticeship system through raising the technical content and adding elements of modern apprenticeship training practices, including the introduction of trade testing, the provision for related classroom instruction and the upgrading and standardisation of conditions of employment. As the working proprietors (including supervisors, foremen and key workers on the shop floor engaged in the larger establishments of the small industry sector) are the main agents for technical progress, steps should be taken to equip them fully with the knowledge and skill required to initiate and carry out such training.

(g) In designing the training programmes particular account should be taken of likely changes in applied technology, methods of work, product choice and job content; this would be preferable to basing them on existing manufacturing practices in small industry.

(h) In respect of new manufacturing activities, emphasis should be placed on integrated technical and managerial training of groups of prospective small entrepreneurs and key workers for the industry. Such training programmes might be conceived on an ad hoc basis, leaving it to a few established industrial pioneers to set the pace for others who, encouraged and supported by suitable incentive and extension schemes, would further expand the industry by setting up additional enterprises.

Practical Applications: Integration of Technical Training

Earlier in this paper (page 146) mention was made of the need to promote the development of small enterprises through an integrated programme whereby a number of investments are expected to yield a number of predetermined outputs. In projects of this kind, technical training would feature as a prominent investment; the effectiveness of a training programme organised on a group basis is likely to increase manifold if the training effort is supported and reinforced by complementary measures taken in the interest of the enterprise group as a whole. Such group training may be arranged under a scheme whereby several undertakings associate, for example providing related instruction, ensuring the full training of apprentices by rotating them among firms and employing a full-time instructor or training officer for the planning, organisation and control of training. But most important is that such group training will recuperate some of the advantages of the journeyman system, customary in traditional European apprenticeships, which constitutes a period of rotation designed to give the trainee a broader comprehension of his trade, versatility in skills, knowledge of new methods and an understanding of the differences in operating conditions applying to his trade in different areas.

The successful operation of joint training co-operatives requires facilities to provide related classroom instruction in theoretical and manual skills. This could be provided by technical schools and vocational training centres. The great majority of these institutions operate in the same manner as in industrialised countries: they generally follow the normal scholastic pattern of day-time instruction with a weekly rest day, interspersed with periodic holidays. Such an operational system may be justified in high-income countries, but in developing economies it would seem to constitute a waste and a serious under-utilisation of an important resource. In these countries the technical schools and training centres could probably double their output with little increase of investment in fixed plant if they were geared to the training needs of small industries; this would also save appreciable public funds—including foreign exchange—invested in premises and equipment.

Obviously, numerous practical difficulties will have to be overcome before training institutions can be fully utilised. Additional equipment, more suitable for small enterprise operations, may have to be added; special teaching aids will have to be developed to facilitate training of people experienced in industry but with little or no general education; extension service units will have to be located in the institutions to maintain close liaison between training and industry and to ensure that all training activities are integrated in over-all small industry promotion; additional instructors will have to be employed and specially trained to cater to the needs of groups of students accustomed to less elaborate manufacturing processes. But the problems involved to effect these necessary adjustments would seem minor as compared with the considerable benefits that will accrue when an apparently neglected resource in the national vocational education and training system is fully utilised.

Moreover, technical and vocational education and training institutions, utilised in the way suggested above, could easily double as technical and managerial extension and information centres for small enterprises. Training in advanced skills is not enough; a considerable amount of technical follow-up is necessary in order to ensure that trained people, both working proprietors and operatives, will fully apply their skills under conditions prevailing in their own enterprises. Certain elements of technology are best introduced in industry through in-plant instruction. Apart from the advantages for the enterprises thus assisted, it is likely that closer contacts between training centres and industry will give the teaching staff a better understanding of operational conditions in industry, which will consequently better equip them for their training task.

One might further visualise a development whereby the technical education and training institutions would include plant and equipment for common production facilities (e.g. jobbing services in heat treatment or buffing in leather processing), which the small enterprise cannot run itself for reasons of cost or lack of specialised skills. Such common production centres could also be used to provide in-plant training for small industry personnel, thus allowing more intensive utilisation of available staff and physical resources of technical schools and training centres.

Further, with little additional effort, other facilities existing in large firms and in military establishments could be utilised in the interest of technical training for small enterprises. Many large undertakings, including those operating in the public sector (such as the railways and public works departments) maintain subcontracting arrangements with small enterprises, or could easily develop such arrangements by promoting the creation of small units to provide them with the parts and components they require; action of the latter type is being taken by public sector enterprises in India with apparent success.[1] Technical training schemes would fit in logically in any subcontracting arrangement. This is particularly so since skill levels required to manufacture a product successfully are best determined in co-operation with the parent firm, which establishes specifications for the products to be subcontracted.

Similarly, large firms manufacturing or distributing industrial supplies could usefully co-operate in government training schemes for personnel engaged in small enterprises. For example, raw-material processing plants (e.g., aluminium processing works) and trading firms for the distribution of supplies (like those that market synthetic dyes) frequently maintain as a part of their sales promotion and marketing efforts industrial advisory services of which the small firms particularly take advantage. Co-operation could be sought with these services in the setting up and execution of training schemes for small plants, thereby taking advantage of an existing machinery which will save effort and reduce cost. In all the instances described, training programmes could establish an organic link between smaller and larger firms; this would either improve performance in the manufacture of the subcontracted products or provide for a more efficient utilisation of supplies marketed by large firms.

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[1] Under a scheme initiated by the government-owned Hindustan Machine Tools Ltd. in Bangalore highly skilled craftsmen are being selected and given additional training so as to prepare them to operate small light engineering shops (10 to 20 employees per establishment) located on an industrial estate adjacent to the factory. These small enterprises manufacture under subcontract certain parts and components for assembly in the parent factory. Through periodic retraining arrangements the small working proprietors are kept up to date in technical and managerial skills.

Further, the many training facilities available in military establishments can also be used in the interests of promoting small enterprises. As a result of technical training during military service to meet the needs of the armed forces, many skilled people, such as mechanics and electricians, are regularly added to the civilian labour force. It would appear that existing arrangements could be improved and expanded to supply the small enterprise sector with skilled personnel, without imposing undue burdens on the military establishment. Firstly, consideration may be given to introducing in the military establishment training in occupations and trades in which the scarcity of manpower particularly restricts the growth of the small enterprise sector. The required skills could be identified in joint consultation with the national manpower planning authorities and government agencies for the promotion of small enterprises and the necessary training provided during military service. Secondly, special training in entrepreneurial and managerial skills could be given to military personnel who have been trained as skilled technicians and have shown organising ability and leadership talent during military service. Such additional training would help them to successfully establish and operate as working proprietors small enterprises in their particular technical specialities upon their discharge from military service; such programmes would make a real contribution to the development of small enterprises if the entrepreneurial and managerial training were supported by industrial credit schemes. In this way profitable use could be made of a large number of hours of low military productivity of an army in peacetime.[1]

CONCLUSION

The previous discussion of the process of skill formation for small manufacturing enterprises in its various aspects indicates that it is still a developing concept requiring special efforts to ensure that it will fully meet the objectives for which it has been designed. It is also an expensive activity. This is obvious with regard to technical training programmes, since these require for their proper execution rather costly equipment and material for the trainees to work on. But training in entrepreneurial and managerial skills is equally costly in view of the scattered nature of the industry, the variety of manufacturing processes carried out on a small scale and the expense involved in associating capable staff with such programmes. In addition, experience shows that training programmes which do not fully meet the practical needs of the small industrialist invariably lead to disillusion with the concept of training itself and to rejection of the idea that the development of the enterprise can be accelerated through the acquisition of advanced knowledge and skills. Therefore, in order to ensure that moneys spent and efforts made in the design and execution of training programmes will fully attain the set objectives, the aims of training and its practical effect at the level of the enterprise should be evaluated at regular intervals. To be fully effective, such evaluation should be a specific activity of the authority responsible for training for small manufacturing enterprises, and it should be supported by an appropriate administrative machinery. Evaluation carried out through the application of cost-performance analysis systems is useful not only to correct defects and omissions as they become evident in programmes under review, but also as a means of collecting the elements for the preparation of future training programmes.

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[1] C. P. KINDLEBERGER: *Economic Development* (New York, Toronto, London, Sydney, McGraw-Hill, 1965), pp. 109-110.

PART II

OTHER POLICY ISSUES

5. SOCIAL PARTICIPATION IN INDUSTRIAL DEVELOPMENT

INTRODUCTION

The achievement of broad participation by the active population is one of the three main aims of the campaign for the development of human resources during the United Nations Development Decade.[1] The desirability of such participation is recognised in numerous resolutions and declarations adopted by international and regional organisations, including a number of international instruments adopted by the International Labour Organisation dealing more particularly with the role of employers' and workers' organisations. However, insufficient attention has so far been paid to the need to adapt these general principles to the specific conditions of the developing countries or regions when industrialisation programmes are being prepared. The first steps in this direction have now been taken within the United Nations family, and the I.L.O. is giving high priority to the solution of this problem in its programme for the development of social institutions.

Whether it be at the level of the nation, of a particular region, a district or a single undertaking, any industrialisation programme implies the application of a series of technical, financial and administrative measures and calls for the settling of a great variety of economic and social issues. The human problems involved are particularly numerous and intricate, especially those relating to social and labour relations.

Industrial development, in fact, both calls for, and brings with it, radical changes in the way of life and work of the populations directly concerned, and its success depends to a large extent on their active co-operation. They have to provide the manpower for industry and must gradually adapt themselves to new conditions of life and work. In the process of industrialisation, therefore, the creation of social tensions and profound antagonisms is inevitable; they are the result of changes in social and cultural conditions and cannot, like technical problems in industry, be avoided by merely importing methods and practices from the highly industrialised countries; a patient effort must be made to find solutions adapted to local needs and circumstances. Frank discussion with the social groups involved is a condition *sine qua non* of any true progress in this direction.

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[1] See United Nations, Economic and Social Council: *United Nations Development Decade: Proposals for Action*, document E/3613 (New York, 1962), p. 25.

Another element in the success of industrialisation programmes is the institution of effective machinery for communication and consultation, so that the public may be kept informed with regard to medium- and long-term objectives of industrialisation programmes and projects and the methods to be used to achieve them, and so as to obtain all opinions and suggestions likely to be useful in the formulation, and if necessary modification, of projects or programmes in the light of local needs and resources. Without such consultation, plans drawn up by the administrative authorities and technical experts will have no real meaning; they will be unlikely to arouse the active interest of the working population, and will be liable to encounter such economic, technical, social and human obstacles that the achievement of any industrial objectives —even in the most restrictive sense—will be impossible. In fact, it seems that only by effective social participation can the population be induced really to co-operate in industrialisation programmes or projects so that, as they are implemented, such programmes or projects gradually become a real factor in the economic and social development of the countries or regions concerned.

Social participation in industrial development may today take a great variety of forms. Traditional institutions or groups can play a part in launching an industrial project in an area formerly untouched by outside influences. Or again, local authorities, political bodies and other local groups and voluntary associations may act as spokesmen for the population. At a higher level, there may be governmental bodies and workers' and employers' or other organisations, all with coinciding or overlapping interests in particular industrial projects or programmes. The success of social participation will, of course, also depend upon a whole range of non-institutional aspects of social life; it is easier to obtain the co-operation of the different social groups in the various participation schemes if they are morally and materially involved.

The aim of the present report is not to provide an exhaustive description of all the possible forms of social participation, but to highlight those aspects which are linked to labour and working relations, without, however, losing sight of their social context.[1] For the purposes of this report, therefore, social participation in industrial development is at two levels:

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[1] Some aspects of social participation have already been examined elsewhere, in particular by the United Nations (the part to be played by local authorities and the problems encountered by public undertakings, for example), or are referred to in other papers, particularly Nos. 3 and 8.

(*a*) at the level of the individual, where it covers all measures aimed at adjusting workers to the industrial way of life and creating a social climate favourable to industrialisation, in particular by adequate organisation of human and social relations in the industrial sector, and especially in the industrial undertakings themselves;

(*b*) at the group level, where it may be defined as a combined effort by various social groups (trade unions, employers' organisations, co-operatives, etc.) which are independent of the State and which represent economic, social or occupational interests, to co-operate in the working of state institutions and in the process of industrialisation directly or indirectly sponsored by the government.

Although in practice it is often difficult to draw a clear line between these two closely interrelated types of participation, a distinction between the part played by the individual in the group (the primary level) and that of the group in society (the secondary level), facilitates examination of the innumerable problems of social participation and emphasises the twofold nature of what follows.

At the primary level, the basic aim is to adapt industrial structures to the concepts and mentality of a pre-industrial society by setting up a code of practices and policies for the regulation of human and labour relations. The success of social participation will depend above all on a whole range of material and moral incentives for workers (prospects of social or occupational promotion, of a better, more self-respecting life), since these form the backbone of the various participation schemes at the individual, group and institutional levels. Equal importance should be attached to questions of collective relations between the organisers of industrial development and the workers engaged in industry; when these are satisfactory they help to create a social atmosphere in which industrialisation can proceed smoothly, and to promote more active co-operation by the population in the implementation of industrial development projects (Section I).

At the secondary level, participation of social groups in industrial development may follow a number of patterns. In some cases, such groups will be associated with the preparation of an economic development project, policy or programme at the local, industrial, regional or national level. In others, social groups will play a part in the implementation of the projects, policies or programmes at the local, regional or national level; such participation may take the form of consultation only, or the groups may have a voice in the decisions. In this report the term " social groups " is to be understood, mainly, as referring to workers' trade union organisations, employers' associations and co-operatives; the role of other representative groups will be mentioned in passing (Section II).

After examination of the main problems relating to social participation in industrial development in the first two sections, Section III will be devoted to a number of questions which must be taken into account in the framing and implementation of an industrialisation policy intended to provide also for social participation.

I. INDUSTRIALISATION AND INDIVIDUAL AND COLLECTIVE LABOUR RELATIONS

True social participation in industrial development is inconceivable in an atmosphere of indifference, tension or constant social conflict, and the first concern of the promoters of such participation should be to find ways and means of bringing about the necessary adjustments. Apart from the major political or constitutional tensions and conflicts, which are out of the present context, the necessary adjustments must be made to ensure satisfactory individual and collective relations between the industries that are to be set up and the human elements that are to be used in them.

When measures of this type are being studied, the specific nature of labour relations during the process of industrialisation is one of the key factors to be considered. Where there is an industrialisation programme or project, there is necessarily a pre-industrial society, usually predominantly rural and based on a variable range of " traditional " structures and values. In such societies the notion of the contract for the hire of services, and the importance in this respect of belonging to a group and of having a certain status within that group, is almost non-existent; there are no trade unions or workers' organisations; voluntary associations are unknown, their place being taken by territorial or ethnic systems; there are "natural" spokesmen or representatives who can be designated in case of need by the different social groups without any complicated formalities; the attitude to the basic elements of social life, such as a sense of time, justice, property and thrift, individual and collective effort, etc., is entirely different; there is a great diversity in the ways in which majority opinion is established for the settlement of disputes of all types, or simply in methods of communication.

In the past, there was very little knowledge about these features of non-industrial societies, or they were considered as incompatible with industrialisation, which was expected to develop out of the production organisation and techniques evolved in advanced industrial societies and to model itself closely on the lines of management and labour relations systems characteristic of such societies. Today, there is a better understanding of pre-industrial society, and experience has shown how many difficulties are encountered when an attempt is made to import industrialisation methods from outside. We are consequently beginning to recognise the need for social factors to be taken into account from the outset in any industrialisation programme or project.

Individual Labour Relations

The first direct contacts between indigenous inhabitants and modern industry will be contacts between individuals in the newly installed industries. It is generally at this level also that the origins of the tensions and conflicts underlying industrial development are to be found. This means that any attempt to obtain the direct co-operation of workers in the industrialisation effort must start here.[1]

The great majority of countries in the process of industrialisation have instituted more or less detailed regulations governing the legal relationships between employers and workers, but these are often based on the conditions found in industrialised countries, so that they are not entirely suited to the mentality, desires and needs of workers coming from a traditional rural environment. An employment contract freely negotiated between partners considered to be equal does not compensate such workers for the loss of status and security when they leave their traditional homes, or for their inability, in new surroundings, to satisfy their vital needs. Workers will generally tend to feel that their employers are responsible, at least to some extent, for their living conditions and will expect them to do something about them.

These extra-contractual responsibilities should, therefore, receive the very careful attention of those responsible for development at all levels. Problems of transport, housing, the supply of essential and other goods, of drinking water, electricity, etc., can often be simply but adequately solved with the resources an undertaking has at its disposal or can readily obtain, whereas the individual worker has no possibility of solving them. When such facilities are provided in collaboration with the workers concerned, or their representatives, a favourable atmosphere for the development of an industrial society will be created.

Although in some cases there are national regulations concerning the adjustments to be made, a creative effort will always be required within the undertaking itself if the industrial worker's status and conditions are to be to some extent adjusted to the characteristic pattern of his original environment. This adjustment would be greatly facilitated by the introduction of training courses to give workers a clearer picture of what industrialisation means, of how it contributes to national and individual well-being, of the relationship of their own work to what the undertaking as a whole is doing, and of the place of the undertaking within the industry and within the national and international economy. Above all, workers should be acquainted with their rights and obligations under the labour laws, including their right to join a trade union of their own choice. Membership of a union can, in fact, help new workers in industry to solve certain problems of their life and work and give them a sense of security and a feeling that mutual assistance of the kind they used to enjoy in their village or tribe is available in the new environment.

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[1] See *Report on the World Social Situation, 1965*, op. cit., Part II.

Staff Policies

The prime function of a rational and effective staff policy in a period of industrial development is to adjust rural workers to the industrial way of life.

Staff management in industrial undertakings is dealt with in another part of the present report; we shall confine ourselves here to mentioning a few of the delicate questions involved. They include work discipline and the numerous procedures necessary for the smooth running of the undertaking, such as recruitment, the fixing of wage and production levels, the line of command, promotions, the settling of individual claims and disputes, staff reductions and dismissals. There will be different aspects to all these problems according to the circumstances, and it is impossible to generalise. Nevertheless, there is no doubt that in the best interests of industrial development, those in charge at the various levels should classify these problems so that a coherent over-all policy of individual labour relations may be established in accordance with modern concepts of social justice and prevailing local conditions.

Participation of Workers in Decision-Making within the Undertaking

Machinery for consultation and co-operation within an undertaking is, of course, far more common in highly industrialised countries, but experiments in this direction are also to be found in the developing countries. Joint advisory committees, staff delegates, works committees and similar bodies have been introduced into industrial undertakings in several such countries, usually under foreign influence before their accession to independence. New management bodies in which workers participate have been set up in recent years, or are being studied, in certain countries where industrial development is confined primarily to the public sector. These experiments are too recent and too little known to be judged as a whole and can only be evaluated in the specific context of a given undertaking, industry or country.

It is, however, certainly true to say that in the larger industrial undertakings the important point is that consultation and co-operation machinery should be set up in the early stages of development. This is in the best interests of the undertakings themselves in view of the greater isolation of the social groups concerned and of the shortage, if not complete absence, of other means of contact that are available in more advanced industrial countries, such as trade unions and other voluntary local organisations, regional and industrial press, and group social and political activities. In addition, the problems to be solved are much broader and much more urgent, since it is a question of introducing in a short space of time a whole system of industrial practices to meet local circumstances and not merely of gradually adapting practices that have been worked out and assimilated by successive generations.

In the operation of the machinery in question in the early stages of industrialisation, the following elements are particularly important: observance of local traditions when workers' representatives are designated and when forms and procedures for discussions, decision-making and expression of opinions are being instituted; need to ensure adequate status and protection for workers' delegates and to provide them with the facilities to enable them to perform their duties satisfactorily. Procedures which run counter to the local customs with which workers are familiar are liable to fail in their purpose and to aggravate rather than diminish existing social tensions.

The aims of systems for workers' participation in the running of an industrial undertaking vary, of course, considerably. Although, as we have seen, it is desirable to set up appropriate machinery to enable workers to discuss their problems with the management for the purpose of arriving at an agreed solution, the granting of more direct forms of participation in the life of the undertaking is often inspired by a desire to increase production and to integrate the worker more completely into the industrial community. Special machinery is often set up to provide workers with greater incentives (profit-sharing, wages linked with productivity, etc.); in some cases, especially in the public sector, workers are given certain managerial functions, often limited to social services or certain aspects of the staff policy, but which may also be real management functions, even on the economic side.

Finally, direct participation of workers in the management of industrial production units may take the form of co-operatives, or other similar organisations of a pre-co-operative or para-co-operative nature.

This kind of participation may meet a number of objectives and may take a great variety of forms. For example, the participation of farmers in the creation of an undertaking designed to process their produce or to provide other services such as transport or packing is often an indispensable feature of rural development programmes. The same is true of handicraft or other small-scale industries, which can often benefit from common industrial services. Schemes of this type can be very valuable in the early stages of industrial development because they can offset the lack of local employers with the necessary experience to engage in such activities which, although essential, represent too small a turnover to justify application of the techniques used in large-scale modern industries and therefore tend to be neglected by the latter.

In most cases, undertakings of this type, if they are to develop and achieve any standing, need solid outside support—material and technical help and assistance in the training of supervisors, etc. This support comes most often from public bodies specialising in programmes of co-operative and rural development, promotion of small-scale industries, development of industrial areas, etc., and can be usefully backed up by the appropriate social and occupational organisations. Many national plans give a good deal of attention to developing undertakings based on producers' associations, for this is one of the most promising forms of direct participation in industrialisation and modernisation by large sectors of the population.

Industrial Relations

In view of the spectacular nature of industrial conflicts and the political repercussions of the social tensions underlying them, governments, industrialists and the general public have always paid special attention to industrial relations. Employers, workers and their organisations can do little to promote social participation in industrial development if conflicts of interests dissipate their energies and leave them no time to think about medium- and long-term objectives.

In the developing countries workers' and employers' organisations are relatively new and have as yet had little time to establish machinery to co-ordinate their relations with one another. In general, they have neither the resources nor the experience necessary to enable them to obtain the best results from voluntary procedures for bargaining and settling collective disputes, which have, nevertheless, been made available to them under the legislative provisions in most cases. In some countries national development policies or programmes limit the freedom of the parties concerned to conclude agreements, or even suppress it altogether, either by compulsory arbitration or under an over-all policy that is more or less directly geared to the structure of national planning. In many countries the national system for the fixing of minimum wages, or the wage policy in the public sector, plays an important role in very large sectors of the economy.

It will be seen, therefore, that collective relations in industry may be established on widely varying bases according to local conditions, and that they differ quite considerably from those usually instituted in the industrial countries, where a more standardised system is generally adopted, based on clearly defined factors of prime importance in production and industrial relations.

The situation in the developing countries means that the governmental authorities must take the initiative in promoting voluntary negotiation or in arbitrating for the settlement of collective conflicts or, from the outset, assume the main responsibility for fixing wages and other conditions of work. In any case, real and adequately co-ordinated participation of workers' organisations is the first condition for effective and rational operation of the national machinery and an essential element in any policy for the association of such organisations in programmes of industrial development. It cannot be expected that organisations will wish to involve themselves to this extent—in fact, they cannot, without losing their influence on members—unless they are also to have some say in decisions affecting the short-term interests of the social groups they represent, at whatever level such decisions are made. Participation in these day-to-day decisions will alone open the door for joint study of the longer-term problems of development.

II. Workers' and Employers' Organisations and Their Contribution to Industrialisation

As a point of departure for the direct and active association of workers in industrial development, in particular through the social adaptation of the population to industrialisation, the establishment of individual and collective labour relations—the main aspects of which were mentioned briefly in the preceding section—is essential if organised social groups are to participate in the process of industrialisation. The main problem in the establishment of industrial relations in the developing countries is how to strengthen the voluntary workers' and employers' organisations [1] so that they can assume direct responsibility for the representation of the respective interests and participate, on behalf of those they represent, in the preparation and implementation of industrial development projects and programmes.

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[1] Some participation machinery can be given official status and independent financial resources so that the voluntary organisations themselves are relieved of certain tasks and expenses while continuing to exert their influence. Examples of such

The question of strengthening the employers' and workers' organisations, a prerequisite for their participation in industrial development projects and programmes, will be examined in this section before going on to study the machinery through which participation at this level can be achieved. The problems that arise in the workers' unions are not the same as those of the employers' organisations.

Workers' Organisations

Trade unionism is closely bound up with industrial development, and the movement becomes familiar to all countries as the industrialisation process continues. In spite of the different experiences in this field resulting from the economic, political and social conditions in the various countries, it may be said that everywhere the trade unions have stimulated industrial development. They are vigorous defenders of the workers' interests, but they nevertheless help to relieve tensions, buffering the shock of economic changes and easing the conditions in which they take place. In this way the unions increase the effectiveness of the national effort; side by side with the employers and other leaders of the economy, they play an essential role in the establishment of the communication between social groups without which no democratic society can grow.

Trade unions are relatively new in most of the developing countries. Their growth is hampered by a number of familiar obstacles: the small proportion of wage earners as compared with the total labour force of the nation; the high degree of under-employment; low wages; illiteracy; lack of official recognition or of adequate statutory safeguards; inadequacy of material resources and lack of any organisational tradition or experience; absence of competent supervisory staff. In spite of all these difficulties, trade union movements in many developing countries have made great strides in the last ten to 15 years. Apart from their efforts to defend their members' interests, the trade unions of these countries are extending their field of action by participating at a high level in the preparation and implementation of industrialisation programmes[1], and

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arrangements, offering considerable material advantages to workers, exist in many industrialised countries. They cover education of workers and trade union officers, organisation of leisure and management of social services. In most cases they have evolved over long periods; only very rarely was adequate attention paid to these matters in the initial stages of industrialisation.

[1] See below pp. 176-178.

are attempting, at least in part, to solve the problems of workers as members of the group, as producers or as consumers. In a number of developing countries, several types of co-operative movement (transport, consumer, housing, distribution, production, savings and credit, workers' banks), and various social, educational and cultural services are being created or expanded under the auspices of the trade unions. In some cases the trade unions are assuming responsibility for primary education, literacy campaigns and the vocational training of their members; they help to create and run hotels, restaurants, canteens, nurseries, schools and medical services, and operate public social security services. These efforts on the part of the unions may appear modest, but in present circumstances they are making a considerable contribution to development and industrialisation.

In attempting to define the part workers' organisations are called upon to play in industrial development, it is not possible to ignore completely the political and institutional framework in which they evolve. In many cases the trade union situation has changed radically in recent years as a result of political and economic reforms introduced in various countries to consolidate the political leadership and to mobilise all the available social forces for economic development and rapid industrialisation. The trade unions thus find themselves dependent upon a political or administrative machine in which their function of defending workers' interests is pushed into the background. On the other hand, as a result of this situation, the unions usually obtain official recognition and status and are even, on occasion, able to extend their activities. On the other hand, in countries with multiple political, economic and social structures, there are often very few militant trade unionists, and in some cases sharp antagonisms make participation in industrial development extremely difficult.

Nevertheless, however small the membership of the trade unions in the majority of developing countries, and in spite of the initial difficulties encountered by their leaders as they attempt to find their way among the complex problems arising from the development of an industry or undertaking, these are not permanent obstacles to contacts between the organisers of industrial development and the trade unions. The very existence of the unions is a sign of adaptation to modern usage. The present weakness of the unions should not overshadow the real, if somewhat fragmentary, part they play in establishing communication among the mass of workers attracted to the new industries.

Those in charge of industrialisation are particularly well placed in this respect to initiate and maintain useful contacts with the unions. For their part, in addition to genuine recognition of their existence and of their potentialities as representatives of the workers, the unions, especially at the early stages, need a whole range of material facilities without which they cannot perform their tasks in an up-to-date and effective manner. If they are to develop, and participate usefully in the effort of industrialisation, they must be directly encouraged in a number of ways. Even in some of the most highly industrialised countries such encouragement is vital if the unions are to participate, for example, at the consultative and planning stages. Assistance of this kind cannot fail to promote industrialisation, on condition that it takes the form of durable measures that are genuinely in the common interest and that are not applied by rules which shackle the functional autonomy of the organisations concerned and thus render their participation void of all meaning.

The trade unions may need immediate assistance of many kinds: premises for their secretariat and meetings; means of transport; compensation for loss of wages resulting from trade union activities; facilities for the collection of trade union dues; help in setting up educational and social machinery. Particular stress should be laid on the importance of promoting educational activities to enable the trade union organisations to participate fully in development planning. This involves instructing workers' representatives at different levels in the aims, principles, and methods of development planning and in the part the unions can play in this planning. Such training renders service to the nation and consequently the public authorities should support the efforts of the workers' organisations on whose shoulders the main responsibility rests.

Employers' Organisations

The problems of social participation in industrialisation by the representatives of the various sectors of the economy are different from those relating to the participation of the workers' representatives, but just as important. At the early stages of industrial development the creation and organisation of representative groups of producers run into difficulties on account of the great variety of categories involved: indigenous farmers and planters in the sector who still follow traditional methods or are in the process of modernisation; small local tradesmen and craftsmen; heads of small or medium-sized businesses; persons engaged in public undertakings and large international concerns which exert a considerable influence on the economic life of the country.

It is nevertheless necessary to create organisations representing these numerous categories if all sectors of the economy are to participate effectively in the preparation and implementation of industrial development projects and programmes. The participation of employers' organisations in the industrialisation effort has undeniable advantages since it facilitates exchanges of views regarding the economic interests involved and helps to throw light upon the advantages and disadvantages of projects or programmes drawn up by technical services, and upon the methods it is proposed to adopt. Institutionalised representation of producers' interests is equally necessary for the purposes of ascertaining the economic and social impact[1] of the introduction of new industries, and of formulating social and labour policies (wages and other conditions of work, training workers, etc.).

In countries where the economy leans heavily on the private sector there is generally a twofold representation of individual producers: on the one hand, the chambers of commerce and similar organisations in industry and agriculture, usually with an official status, their basic purpose being to represent the economic interests of the producers concerned; on the other, the voluntary organisations of producers or employers which are interested more particularly in social and occupational problems.

In the early stages of industrialisation the formation of these representative bodies is often beset by difficulties. This is especially true of the voluntary organisations subject to private law, since the official bodies generally have greater resources from producers' compulsory contributions and other sources of income provided by the legislation. Nevertheless, official support is almost always vital to both types of organisation if they are to play a real part in the numerous tasks inherent in industrial development. It is often difficult, and it will remain so for a long time to come, to bring about effective organisation of certain types of producers, especially those in the handicrafts and small industries sector, and in the absence of representative organisations the responsibility for safeguarding the interests of these categories is often assumed by the government's administrative or technical departments.

The public undertakings are confronted with the same difficulty: through lack of an adequate representative body, they have to find their spokesmen in the appropriate government departments or services.

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[1] For example, increased production in a few newly established undertakings using very modern techniques not infrequently causes a marked decline in the production of older sectors of the economy, and this can seriously prejudice the over-all development prospects of a country or region. Consultation on a broad front among the national producers is not, of course, a universal solution, since such situations cannot always be foreseen or avoided, but it often serves to draw attention to the inherent dangers and to ensure that industrial programmes or projects are adjusted accordingly.

This problem is particularly acute in countries where the public sector absorbs a large part of the economic activity and where it may seem desirable to establish separate representative bodies for the various types of public undertaking or service.

If the real interests of industrial development are to be served, questions relating to the representation of employers, and to the interests of producers in general, must be studied very carefully, for there are large economic sectors which, for various reasons, are liable to be inadequately represented when industrial development policies and programmes are being prepared or implemented. The guiding principle of any policy aiming at the rational and really effective development of new industries must be very wide representation of all sectors of production.

Participation of Workers' and Employers' Organisations in the Framing and Implementation of Industrialisation Programmes

The association of workers' and employers' organisations in the framing and implementation of industrialisation programmes presupposes a genuine desire on their part to break out of the limited framework of technological studies and purely economic considerations of efficiency and profits, however necessary these may be. Such association in fact makes it possible to take account of the human aspects of industrialisation, since the satisfaction of man's aspirations and material needs is the basic aim, the *ultima ratio*, of the striving for development. Participation of the organisations representing the active elements of the population—who play the chief role in development—makes the knowledge and experience of these latter available to those who are preparing or implementing industrialisation programmes.

There are many ways in which workers' and employers' organisations can participate in industrialisation programmes and their participation may cover different stages of such programmes. Sometimes they participate in discussion of the general plan of industrialisation, or they may collaborate at a later stage, when problems of the development of one or several sectors of industry are examined or, again, they may help to determine the manner in which the programme is to be implemented, or contribute to the final phase and be associated in the supervision of the practical work and in the evaluation of results. Participation may also be at different levels (national, sectoral, regional, local) and be either direct (the organisations being represented within the official planning bodies) or indirect (by way of informal contacts between the organisations and the public authorities and departments in charge of industrialisation programmes).

It is not proposed in this document to examine the various participation procedures and machinery in countries in the process of industrialisation. These vary enormously from one country to another, the variations depending mainly on political systems and types of governmental bodies, on the strength and nature of the traditional institutions, the social and cultural level of the population, the relative importance and administrative differences as between the public and private sectors of the economy, the type and standing of the occupational and economic organisations representing the two sectors, the technical characteristics of the new industries and the size of the undertakings and, finally, the stage reached in the industrialisation programme.

The International Labour Organisation has for several years been paying special attention to methods and problems of participation in economic development, and a number of studies have been made of the various aspects of the question.[1] Hereunder we refer only to certain of the general guiding principles to be taken into account in the preparation and implementation of industrialisation programmes based on the participation of workers' and employers' organisations.

It is sometimes possible, even without formal participation machinery, to maintain contact between the promoters of industrialisation and the representatives of the active population. This happens, in fact, in a number of countries at very different stages of development and with quite different political systems. Close, constant co-operation has been established in such countries between the various social groups (workers' and producers' organisations, etc.) and the public authorities. While completely informal in some cases, this co-operation is in others the very foundation of the constitutional structure, especially where there is a single political party. It has been said that such systems have real advantages from the point of view of efficiency since, in certain conditions, they can provide a means of communication between those in charge of the programmes and the social groups involved in the various stages of their application, and at the same time avoid public conflicts arising out of differences of opinion because the government acts as arbitrator when necessary. With all due regard to the contribution these systems can make to acceleration of industrialisation, it has nevertheless been pointed out that they run serious risks because the communication channels can always be blocked and the initial enthusiasm of the active population may gradually degenerate into indifference; their lasting participation is therefore uncertain.

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[1] See I.L.O.: Metal Trades Committee, Eighth Session (Geneva, 1965), Report III, *The Role of Employers' and Workers' Organisations in Programming and Planning in the Metal Trades*; Eighth Conference of American States Members of the I.L.O. (Ottawa, 1966), *Report of the Director-General: Social Development in the Americas* (Geneva, 1966), Ch. III; Working Paper Prepared for the African Seminar on the Role of Trade Unions in Development Planning (Dakar, November-December 1966) (Geneva, 1966). Several articles on this subject have been published in the *International Labour Review* (Geneva, I.L.O.): an introduction (Vol. 93, No. 4, Apr. 1966, p. 331), and a number of studies on the position in France (ibid., p. 337), Ireland (Vol. 94, No. 1, July 1966, p. 54), the Netherlands (ibid., No. 3, Sep. 1966, p. 274), the Maghreb (ibid., No. 4, Oct. 1966, p. 375), Byelorussia (ibid., No. 5, Nov. 1966, p. 449) and Japan (ibid., No. 6, Dec. 1966, p. 511).

In multi-structured societies (competing political parties, workers' and employers' organisations, etc.) there is a great variety of institutional machinery for participation. In industrial development this machinery generally takes the form of advisory councils whose competence can embrace industry as a whole, or be limited to particular branches of industry or certain definite questions (productivity, manpower, training, wages, etc.). Various obstacles hinder the operation of these advisory councils, especially in the early stages of industrialisation. It is rare, for example, that adequate material means and technical and administrative facilities are available to enable them to carry out the various and complex tasks involved in the study of a development programme. The smooth running of participation machinery can also be upset by discord between the social groups represented. The difficulties can only be overcome by a firm determination on the part of the authorities to achieve development, combined with an informed search for the means and techniques to make social participation effective.

III. NATIONAL AND INTERNATIONAL ACTION TO PROMOTE SOCIAL PARTICIPATION

One of the essential elements in an industrialisation programme is the establishment of a policy of social participation aiming at coherent and sustained action at the local, national and international levels.

National Action

Whatever the particular local features, measures taken to promote the active population's participation in the industrialisation effort must be an integral part of the over-all plan for participation, and must take into account the social, cultural and economic factors which determine the form and method of participation. Isolated measures or reforms may have their uses, especially when they serve as pilot experiments, but they can do little in themselves to bring about a fundamental and lasting change in individual attitudes and in the general social atmosphere.

What, then, are the main elements of a policy for the promotion of social participation in a given industrial development programme or project? A distinction should be made between the general principles of such a policy and the methods used to apply it.

General Principles.

The general principles of a policy to promote all types of social participation at all levels must be based on a thorough knowledge of the social and cultural environment in which the new industries are to be set up. Such knowledge is a prime necessity, and should be the point of departure for any social participation policy, whether at the primary level—i.e. at that of the interrelationships of individuals in the undertaking—or at that of the workers' and employers' organisations. First of all, an inventory of the existing social structures, whether traditional or modern, should be made and studied; the main functions of the different social groups should be defined, their capacity for making a useful contribution to the industrialisation effort should be assessed, and the ways in which they are to make such a contribution should be indicated (see above, pages 166 to 167).

Another important factor in primary level of social participation is the situation of workers who have recently left their original rural environment and are living under completely new conditions with a totally different status. One of the high-priority tasks in the promotion of social participation is, in fact, the institution of regulations, practices and services to meet the needs created by industrialisation. Such provisions must, of course, be closely adapted to local conditions (see above, pages 167 to 178).

The same applies to the establishment of collective labour relations, whether within an industry or undertaking or at the national level. The development of rational, coherent industrial relations adapted to the requirements of industrialisation is an excellent means of promoting social participation. Systems enabling workers to take part in the discussion of matters of common interest in an undertaking, or giving them some material incentive to take an interest in production, open the way to better utilisation of the available human resources and of the abilities and spirit of initiative of workers attracted by the new industries. In some cases, the direct association of producers or workers in industrial undertakings opens up a number of possibilities (see above, pages 168 to 171).

The development of organisations representing industrial workers, employers and producers in general, is a way of promoting social participation, and for this reason it should be one of the principal aims of all who are concerned with industrial development. The legislation and industrial practices must, of course, be adapted to the circumstances but, above all, attention must be paid to the problems with which these organisations are faced as a result of their lack of the necessary material means and of tried and tested leaders to fulfil the various functions, especially when the organisations are called upon to take an active part in industrial development. The organisations must also be guaranteed full recognition in all the spheres of activity within their competence (see above, pages 174 to 176).

Finally, workers' and employers' organisations cannot participate in the framing and implementation of industrial programmes or projects unless there is a real and active desire for such participation on the part of those responsible at all levels. Such participation may take the form of direct, informal contacts between industrial promoters and the social and occupational groups concerned (trade unions, employers' organisations, co-operatives) but in most cases it seems preferable to organise participation within some more formal, durable framework, such as advisory boards comprising representatives of all concerned at the local, industrial and national levels (see above, pages 176 to 188).

Methods of Applying the Policy.

Once the basic principles of a social participation policy have been laid down, the methods of applying the policy must be studied. Promotion of social participation should be given high priority at the policy and technical levels, and when programmes are being prepared and the means of implementing them are being determined due consideration should be given to the prerequisites for such participation. Although the importance of the effort required in the information and public relations sectors should not be underrated, it is evident that the aims of a policy for the promotion of social participation cannot be achieved if the necessary means are absent or inadequate.

The problems of social participation demand the co-operation of those responsible and of experts in a wide variety of sectors and branches, especially in the formulation of the legislative provisions relating to participation machinery, in the necessary educational, training and information activities and in working out measures to ensure the satisfactory operation of participation machinery.

The public authorities have a particularly important part to play. They must shape the necessary adjustments in the administrative structures and procedures, and provide adequate training for personnel and the essential material means and facilities, if their efforts to promote industrialisation are to be effective, whatever their other responsibilities in regard to the development and management of the new industries.

Generally speaking, the labour ministries and authorities carry special responsibility for the institution of structures and machinery to facilitate workers' and employers' participation in industry, and for this reason some special mention should be made of them. The co-operation of these authorities is necessary, particularly in connection with individual and collective labour relations, for the formulation of regulations governing conditions of employment and other aspects of labour legislation and industrial relations, including the development of workers' and employers' organisations, staff policies, and vocational training.

The industries themselves must find the necessary means to enable them to discharge their primary responsibility towards their workers and train the key personnel required. In co-operation with the public authorities, they must ensure that the necessary material conditions exist for setting up and operating the machinery through which the social groups concerned are called upon to participate in industrial development.

Finally, social participation in all fields requires the co-operation of managers and leaders, promoters and other well-informed elements conscious of their responsibilities, and there must therefore be a coherent policy for the training of these key elements, adapted to the specific needs of the various categories: workers and trade union officials, managerial staff (including personnel managers) and administrators.

International Action

The United Nations and the specialised agencies have for several years, in numerous declarations and resolutions, advocated participation by the population as an essential condition for the acceleration of economic and social progress in the developing countries. In 1964 and 1966 the International Labour Conference adopted two important resolutions, one relating to the concept of democratic decision-making in programming and planning for economic and social development and the other to workers' participation in undertakings. These two resolutions indicate the pattern of the I.L.O.'s future efforts and lay particular stress on the need to intensify research and training in this field.[1]

The United Nations and the specialised agencies recently prepared a number of programmes of practical activities relating to social participation. The I.L.O. itself is endeavouring to discern those particular aspects of social participation which are directly or indirectly related to industrial development and to which it is best able to make a useful contribution.

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[1] See *Official Bulletin* (Geneva, I.L.O.), Vol. XLVII, No. 3, July 1964, Supplement I, pp. 69-70, and ibid., Vol. XLIX, No. 3, July 1966, Supplement I, pp. 46-47.

The International Labour Organisation has been for a number of years concerned with the various aspects of participation by workers, employers and their associations in decision-making at different levels. The I.L.O. Metal Trades Committee made a study of the part to be played by these organisations in economic and social planning and programming[1], and reached unanimous conclusions on the subject. It should also be remembered that the I.L.O. has for many years been engaged in a great number of activities for the promotion of social participation in development. The questions referred to in the first section of this report (individual employment relations, staff policies, labour-management relations) have long been among the I.L.O.'s principal concerns in its standard-setting and research activities and operational programmes.[2] The Organisation has thus accumulated a vast amount of knowledge and experience of most of these questions. Considerable documentation has been assembled and various forms of technical co-operation have been worked out: experts have been sent out to assist governments in the framing of legislation and institution of administrative machinery for its application, in the development of research and training institutes, and in improving industrial practices; bipartite and tripartite study surveys have been organised for groups of responsible elements; seminars have been convened; trainees have been placed, etc.

Great emphasis has been placed in past years, particularly in a series of reports presented by the Director-General to the International Labour Conference, on the need for increased aid to workers' organisations, co-operatives, institutes responsible for the training of supervisors, and the undertakings themselves. Since then the technical co-operation programmes have developed very considerably. The interest shown by many developing countries in the I.L.O. Workers' Education Programme has made it possible to devise a number of different measures that can be applied by trade unions anxious to encourage social participation in industrial development. The I.L.O.'s programmes in the field of labour administration are another contribution: here, the Organisation's activities are more and more directly concerned with the need for increased social participation in economic and social development.

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[1] See I.L.O.: Metal Trades Committee, Report III, op. cit.

[2] Idem: *International Standards and Guiding Principles, 1944-64*, Labour-Management Relations Series, No. 24 (Geneva, 1965), which gives a list of the main publications which have appeared since 1947. See also *Certain Aspects of Labour-Management Relations within the Undertaking (Documents of a Technical Meeting)*, ibid., No. 25 (Geneva, 1965).

Most of the programmes we have mentioned have now been integrated into the major programme for the development of social institutions adopted by the I.L.O. Governing Body in November 1965 [1] and giving the over-all pattern of all the I.L.O.'s different activities related to social institutions designed to promote industrial development. By virtue of this programme, the I.L.O. is now in a position to place at the disposal of all concerned a balanced and co-ordinated range of services with a view to developing administrative and sectoral structures and labour relations in industry.

The technical co-operation programmes worked out by the International Labour Office are available to governments wishing to develop or strengthen their machinery for the promotion of social participation in the industrialisation process. The development of social participation in industry, in its various forms and at all levels, is also the main objective of the research and study programme being at present implemented by the I.L.O., whose resources and experience are also available, if necessary, to those in charge of private projects or national programmes of industrialisation. A comprehensive programme of operational activities and research, closely adjusted to the specific conditions of the developing countries, is therefore at the disposal of national authorities and the international community as a whole.

In addition to the innumerable possibilities offered by the I.L.O. programmes in the fields of industrial relations, labour legislation, labour administration, staff policies, co-operative and similar institutions, living and working conditions, the training of key personnel for undertakings, governments and all those concerned with industrialisation will find that the programmes in question also provide solid bases, at the level of international technical co-operation, on which policies and programmes for social participation in industrial development can be worked out and applied.

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[1] See I.L.O.: *Record of Proceedings*, International Labour Conference, 50th Session, Geneva, 1966 (Geneva, 1967), Appendix XII, Second Report of the Working Party of the Governing Body of the International Labour Office on the Programme and Structure of the I.L.O., paras. 54-10, pp. 708-715.

6. EMPLOYMENT ASPECTS OF INDUSTRIALISATION

The primary aim of industrial development is to increase output and income, not to provide jobs. But it is not a matter of indifference whether the path of development is one that leaves many people without work, or one that provides many new jobs quickly, utilising a country's human potential as fully as possible for development. Governments that have subscribed to the United Nations Charter and to the Constitution of the I.L.O. have recognised an obligation to do all in their power to provide productive work for those who need it, and the International Labour Conference in 1964 adopted a Convention and a Recommendation concerning employment policy which called on member States to declare and pursue as a major goal an active policy designed to promote full, productive and freely chosen employment.

This paper advances six propositions and comments on them. The propositions are—

A. The industrial sector in developing countries provides directly only limited employment in proportion to the amount of capital invested, but makes a long-run contribution to the solution of employment problems to the extent that it promotes rapid economic growth and development.

B. If too much weight is given to short-term employment considerations, countries may choose a product mix and types of technology that do not make for rapid growth.

C. If too little weight is given to short-term employment considerations, countries may choose a path of development that leaves large numbers of people unemployed or underemployed and fails to make full use of their human potential for development.

D. Countries have accordingly to determine what their policy towards employment in the context of industrial development is to be; a useful distinction can be drawn in this connection between relief-oriented employment on the one hand and production-oriented employment on the other.

E. The first and major element in a developing country's policy towards employment in the context of industrial development should be to make sure that all labour that can be employed productively in the industrial sector is employed; and steps should be taken to implement this policy.

F. Some forms of international action may be helpful in this connection.

These propositions will be taken up in turn.

A. The industrial sector in developing countries provides directly only limited employment in proportion to the amount of capital invested, but makes a long-run contribution to the solution of employment problems to the extent that it promotes rapid economic growth and development.

It is well known that in most countries the amount of capital per job provided in industry, particularly large-scale modern industry, is considerably higher than in agriculture and services. In China (Taiwan) in 1961, average capital investment per person employed in manufacturing industry was NT$48,000, whereas the corresponding figures were NT$20,900 in wholesale trade, NT$2,600 in retail trade and NT$2,500 in miscellaneous service industries.[1] In Italy the Vanoni Plan estimated the capital directly needed for the creation of new jobs over the period 1955-64 at 10 million lire per job in industries with heavy capital requirements, 1.5 million lire in other industries and the handicraft sector, and 1 million lire in tertiary activities.[2] It should further be noted that within the industrial sector capital per worker tends to vary between different branches of manufacturing and often also between establishments of different sizes.[3] From the very rough estimates of the growth of manpower requirements in certain key industries in Africa, Asia and Latin America from 1965 to 1975 contained in paper No. 1 above, it is clear that these industries can be expected to absorb no more than a small proportion of the projected increase in the labour force.

A major reason for the unemployment and underemployment prevailing in so many developing countries is the very fact that their economies are underdeveloped in the sense of having not yet developed the knowledge and skills, the institutions, the infrastructure of power and transport and the other forms of capital equipment needed to enable full and productive use to be made of their human resources. To the extent that industrialisation contributes to economic growth and development, it contributes to creating conditions in which employment problems can more easily be solved in the future. (This is not, of course, to say that all industrial projects, even if badly chosen, will necessarily contribute to growth and development. Still less is it to say that well-chosen projects in other sectors are not also needed for growth and development; but this paper is concerned with the industrial sector.)

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[1] *General Report, 1961,* of Industry and Commerce Census of Taiwan.

[2] *Elements of a Programme for Raising Income and Employment Levels in Italy over the Ten Years 1955-64* (Rome, 1955).

[3] Some figures for Colombia, India, Mexico and the United States are given in I.L.O.: *Employment Objectives in Economic Development*, Studies and Reports, New Series, No. 62 (Geneva, 1961), p. 229, table 3.

B. *If too much weight is given to short-term employment considerations, countries may choose a product mix and types of technology that do not make for rapid growth.*

The ability of a programme of industrial development to contribute in the long run to the solution of employment problems may be impaired if too much weight is given to short-term employment considerations in the choice of industrial products and techniques. If people are given unproductive work to do, including work of such low productivity that what they produce is worth less than the incomes they receive in return for producing it [1], these incomes will have to be found, in part at least, from sources that could have been used for other purposes, including investment. If wages, or subsidies to the self-employed, were paid at the expense of investment, this would tend to slow down growth. As was pointed out in a recent I.L.O. report:

> If a policy of employment creation is allowed to check the rate of growth, it is very doubtful whether it can make for welfare. Furthermore, since growth creates employment, it is very doubtful whether such a policy could make for a lasting net increase in employment.
>
> This is not the same thing as to say that it should necessarily be an objective of policy to strive for the highest possible rate of investment with a view to maximising the rate of growth. The price of relative abundance for the next generation might well be tighter belts and a more unequal distribution of income in this generation (because many people would be left underemployed) than a country would wish to have. But most developing countries feel that to attain their social objectives they need a rate of growth not slower but faster than at present, and for this purpose need a high rate of investment, even if it is not the maximum rate.[2]

The important questions in deciding what industries should be set up (the choice of products) and what techniques to use (the choice of methods) seem to be not how many jobs will be directly provided in the short run, but how much income will be generated directly and indirectly in the long run, and how much of this will be ploughed back for further investment. It is the answers to these questions that determine the increase in output of consumer and capital goods generated by an investment project, and the magnitude of the demand for labour to make the goods, though this depends also upon the techniques of production.

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[1] For example, making things in cottages by hand methods that have to be heavily subsidised to compete with more efficient machine production. (It may of course be conducive to long-term growth to protect or subsidise an infant industry during an initial phase if it is expected in time to be able to stand on its own feet.)

[2] I.L.O.: *Employment and Economic Growth*, Studies and Reports, New Series, No. 67 (Geneva, 1964), p. 134.

C. If too little weight is given to short-term employment considerations, countries may choose a path of development that leaves large numbers of people unemployed or underemployed and fails to make full use of their human potential for development.

It is not a matter of indifference whether the path of growth and development is one that provides many new jobs quickly or one that leaves many people for many years with no productive work to do. The problem of finding useful and productive work for school-leavers and others who need it is causing a great many governments considerable anxiety on social and political grounds. Commenting on the view that high capital intensity is desirable in developing countries as a source of profits and therefore of savings and investment, Professor Arthur Lewis has observed:

> Unfortunately, that policy would be feasible only if the labour surplus remained disguised and could therefore be ignored; it is not practicable when the unemployed are roaming the streets and burgling your houses. Most developing countries have to give the highest priority to providing employment now rather than to maximising consumption or income or employment in ten years' time.[1]

Nor is this necessarily a matter of subordinating considerations of economic efficiency and long-term social welfare to considerations of short-term social welfare. For there are reasons for thinking that, often, fewer jobs are provided than would be advantageous even from a strictly economic point of view (see pages 189 to 190 below).

D. Countries have accordingly to determine what their policy towards employment in the context of industrial development is to be ; a useful distinction can be drawn in this connection between relief-oriented employment on the one hand and production-oriented employment on the other.

Developing countries cannot afford a policy of providing jobs as a form of relief regardless of the value or lack of value of what is produced.

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[1] W. Arthur LEWIS: " A Review of Economic Development " (Richard T. Bly Lecture), in *American Economic Review—Papers and Proceedings*, May 1965, p. 14.

But to the extent that countries can provide productive jobs, in the sense of jobs yielding products whose value exceeds their costs, they can avoid having to choose between measures to increase employment and measures to increase production and real incomes: the same measures will serve both purposes. Creation of production-oriented employment is quite a different matter from creation of relief-oriented employment. And if an intelligent and vigorous search is made for ways of providing productive work for those who need it, it is likely that in all countries neglected and unnoticed opportunities for making productive use of underemployed manpower will be found.

For several reasons, it is likely that less labour is employed in the industrial sector (and in other sectors) of developing countries than would be desirable from the point of view of production and growth alone, without giving any weight to employment considerations. If the factors making for excessive capital intensity in the industrial sector in developing countries could be corrected, the role of industry as a direct provider of jobs could be considerably greater than it is. These reasons include—

(a) A possible preference for modern capital-intensive labour-saving industries and technology on grounds of prestige as distinct from economic advantage.[1]

(b) Asymmetry of promotion of the use of capital and labour respectively. This has at least two facets: (i) the fact that the managers or directors who decide how much labour to employ may be, or may be advised by, engineers from industrially advanced countries whose training predisposes them to regard " labour-saving " and " efficient " as virtually synonymous terms, while in countries where labour is plentiful and capital scarce it would be more appropriate to identify efficiency with the saving of capital; and (ii) the fact that labour-saving ideas are more often than not embodied in saleable pieces of capital equipment, sales of which are assiduously promoted; " replacing capital with labour, however, may take more than a purchase [of equipment]—the manager might have to be converted to the subtleties of efficient organisation, a far more taxing achievement ".[2]

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[1] This, of course, is not to deny that there are good economic reasons for selecting some capital-intensive industries and technology in developing countries.

[2] P. STRASSMANN: *Technological Change and Economic Development* (Ithaca (New York), Cornell University Press, forthcoming), Ch. V. The author illustrates the point by referring to one of many United States exporting firms which " has a large sales force abroad armed with ingenious literature to coax entrepreneurs into adding instrumentation to their plants. In Mexico the company conducts training courses in the use of instruments sold. That kind of salesmanship is laudable. But who provides it for the unskilled worker? "

(c) Related to the last point, there are the difficulties of handling a large labour force, and lack of experience of the problems of doing so.[1]

(d) The fact that it is easier to reproduce existing designs than to work out afresh the technical problems of designing a production process. The vast bulk of technological research is carried out in industrially advanced countries with a view to solving problems encountered in those countries, and the most appropriate technology for countries in which unskilled labour is plentiful and capital is scarce may simply not be known.

(e) The fact that " up-to-date " modern equipment may be imported under foreign aid programmes under which donor countries require that equipment be purchased from them (aid " with strings ").

(f) Tax incentives to reinvest profits; benefits are obtained if machines are bought, but not if workers are hired.

(g) The fact that the "private cost" (money cost to the entrepreneur) of employing capital may often be less, and the private cost of employing labour greater, than the real cost to society of doing so. This point is taken up on page 194 below.)

It is believed that there is so much to be done in developing countries in making sure that the employment of labour does not fall short of the level that would make for optimum growth that attention can, and should for the present, be concentrated on this problem. The present paper, accordingly, does not attempt to go further than this or to discuss the question whether, and in what circumstances, it might be reasonable to forgo a certain amount of growth in exchange for a certain amount of short-term employment by accepting a path of development (as determined by decisions regarding the product mix and the choice of techniques) that would not be optimum from the point of view of growth, but that would provide more jobs more quickly.

E. The first and major element in a developing country's policy towards employment in the context of industrial development should be to make

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[1] P. STRASSMANN, loc. cit., quotes as a by-word among industrialists in a Latin American country the saying " *menores obreros, menores problemas* " (fewer workers, fewer problems). He points out that both entrepreneurial hostility and benevolence towards labour tend to yield the same reaction: mechanisation. " The hostile entrepreneur sees each worker as a potential trouble-maker and wants fewer of them. The benevolent manager does not like to run a sweat-shop, exploiting his men's poverty with backbreaking antiquated methods." Nobody would advocate the retention of dangerous or unhealthy jobs, but dangerous or unhealthy features of jobs can often be eliminated by providing relatively inexpensive equipment without abolishing the jobs themselves. Plagued by breakdown and lack of spare parts, many maintenance engineers in under-industrialised countries must have been tempted to develop a slogan " fewer machines, fewer problems ".

sure that all labour that can be employed productively in the industrial sector is employed; and steps should be taken to implement this policy.

This calls for lengthier and more extensive comment than the very brief treatment accorded to the first four propositions.

In the light of what has been said above, the first and major element in a country's policy towards employment in the context of industrial development seems non-controversial. It would seem that every government, and especially a government facing a problem of surplus labour, would wish to do all it can to make sure that as much labour as can be employed productively in the industrial sector (and of course in other sectors too) is employed.[1] What are the possibilities of providing a larger number of productive jobs in the industrial sector of developing countries?

So far as this is a matter of choice of products or of technology—including, where appropriate, the installation of equipment that is second-hand or not of the latest design—the subject has been covered in another I.L.O. paper for the symposium.[2]

But finding ways of using more labour to save scarce capital is not only, perhaps not even mainly, a matter of installing less costly equipment which needs more labour to operate it. Not enough attention has perhaps been given to the scope for productively using more labour in conjunction with given equipment. Three possibilities are worth looking into.

The first is more intensive staffing to reduce the idle time of machines. The more costly a machine, the more important it is to keep it continuously working, even if this means that some of the men operating it are less than fully employed. A major reason for low productivity in many developing countries seems to be the high proportion of idle time of many machines. The optimum degree of intensity of staffing existing equipment, as well as the optimum choice of equipment, depends on the ratio of wage rates to interest rates. A research worker who visited glass-bottle factories in Mexico and Puerto Rico found that:

> The mechanism for stacking hot newly moulded bottles on to a conveyor going into a cooling oven was often out of order. In Mexico, two men with tongs were always on hand to supplement the machine. In Puerto Rico, with wages almost four times as high, such standbys were uneconomical and the glowing bottles went down a reject shoot until the mechanism was replaced or repaired.[3]

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[1] In most countries surplus labour will probably have for the most part to be absorbed outside the industrial sector, but the scope and opportunities for this are not examined in the present paper. See I.L.O.: *Employment and Economic Growth*, op. cit., Ch. VI.

[2] Paper No. 7 below.

[3] P. STRASSMANN, op. cit.

On at least one occasion an I.L.O. productivity team, investigating a textile plant in Pakistan, recommended taking on more workers in order to increase productivity.

A second way of getting more output and providing more employment with given equipment is to prolong the life of the equipment by better maintenance. This can perhaps be regarded as a variety of more intensive staffing.

Thirdly, there is the possibility of organising multiple shifts.[1] If an expensive machine can be worked for 24 or even 16 instead of eight hours a day, there will be a considerable increase in output and employment in relation to annual capital costs (interest and depreciation). This would be true even if the length of life of the equipment depended strictly upon the number of hours it had been in use and nothing else. In this case there would be no saving on depreciation by substituting three shifts for one, but interest charges would be cut by two-thirds. At the other extreme would be a case in which the effective life of a machine depended entirely upon its age and not at all upon how intensively it was used; this is the case with any machine that becomes obsolete while it is still in perfect physical condition. In this case two-thirds of the depreciation as well as two-thirds of the interest charges would be saved. In the more usual case where the effective length of life of a machine depends partly upon its age and partly upon how intensively it is used, the saving would be somewhere between these two limiting cases.[2]

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[1] See on this subject M. KABAJ: " Shift Work and Employment Expansion ", in *International Labour Review* (Geneva, I.L.O.), Vol. 91, No. 1, Jan. 1965.

[2] An example may make the argument clearer. Suppose that the demand for a certain product can be met either by installing three machines and working them eight hours a day or by installing one similar machine and working it 24 hours a day. Suppose the machines cost $100,000 and the rate of interest is 8 per cent. In case A the length of life depends only on intensity of use, and it is assumed that a machine will last nine years on a one-shift system, but only three years if used continuously on a three-shift system. In case B length of life depends only on the age of the machines, and they are assumed to last nine years whether used on a one-shift or three-shift system. Annual capital costs are made up of interest charges plus depreciation, the latter being estimated by dividing the initial cost of a machine by its length of life in years. The savings, in U.S. dollars, under a three-shift system compared with a one-shift system would be somewhere between the following limits:

		Three machines and one shift (1)	One machine and three shifts (2)	Saving (1-2)
Cost of machine(s)		300,000	100,000	
Case A	Interest	24,000	8,000	
	Depreciation	33,333	33,333	
	Annual capital cost	57,333	41,333	16,000
Case B	Interest	24,000	8,000	
	Depreciation	33,333	11,111	
	Annual capital cost	57,333	19,111	38,222

There would seem to be much scope for extending multiple shifts in industry in developing countries, if the various difficulties in the way of doing so—which are probably particularly great in smaller firms—can be overcome.[1] Since they seem to offer such a promising way of getting more output and providing more badly needed jobs with the same amount of capital, the reasons why multiple shifts are not more widely used are worth investigating.

One important reason no doubt is that night work creates difficulties for many workers and disrupts their normal living cycle. Housing conditions for industrial workers in developing countries (and in developed countries too for that matter) are generally not conducive to rest during the day, and the transport and other facilities they need on night shifts may be lacking. These difficulties may be reduced if a two-shift instead of a three-shift system is worked—for example work starting at 5 a.m. and stopping at 9 p.m. Other difficulties may be eased by initiatives taken by employers, perhaps in co-operation with local government authorities, in matters relating to canteens, transport and housing. Even so, workers who have a choice between working an ordinary day shift and working an early or late or night shift on equal terms are likely to prefer the ordinary day shift. But for many workers this is not the choice; the choice is rather between working an early or late or night shift (at least intermittently if shifts are rotated) and not having a job at all. These workers would clearly be better off and would be able to make their contribution to the development of their countries if a systematic effort were made to overcome the obstacles in the way of operating a multiple-shift system; and the savings in capital costs leading to higher profits would make it possible to offer premium payments for working night shifts.

A second reason for the limited resort to multiple shifts is undoubtedly a shortage of various types of key personnel. Supervisors [2] are no doubt among the most important. Who is to look after a second or third shift, particularly in a small family business? In countries where there is little or no industrial tradition, labour unaccustomed to the discipline and rhythm of industrial life needs much supervision, and it is often difficult enough to find suitably qualified supervisors even for one shift a day.

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[1] D. N. DHAR and H. F. LYDALL found that only 25 out of 206 small enterprises in India worked two shifts, mostly with the owner's son or brother in charge. See their *The Role of Small Enterprise in Indian Economic Development* (New York, Asia Publishing House, 1962), p. 56. P. STRASSMANN, op. cit., found that in a sample of industrial firms in Mexico, 18 per cent. of small firms, 35 per cent. of medium-sized firms and 65 per cent. of large firms operated multiple shifts. But 81 per cent. of the firms operating multiple shifts did so for compelling technical reasons such as keeping furnaces going overnight.

[2] Described by STRASSMANN, op. cit., as " perhaps the greatest bottleneck in economic development ".

Process planners may be another category of key personnel in short supply. The processing of materials and the production of components in different departments of a plant need to be co-ordinated so that there are neither bottlenecks nor surpluses that cannot easily be stored. If the different departments get out of step under a one-shift system, the management can perhaps, in an emergency, organise an occasional second shift in one department so as to enable it to catch up. There is no easy remedy under a continuous-process system; if one department falls seriously behind, the whole plant may be brought to a standstill.

Yet again, maintenance and repair are much more difficult with continuous processes. Under a one-shift system breakdowns can be repaired and routine maintenance can take place during intervals between shifts. With continuous operations preventive maintenance has to be dovetailed into the cycle. Carelessness or mistakes leading to breakdowns threatening a stoppage of the whole works are apt to be much more costly than under a one-shift system.

Thus, for various reasons, multiple shifts are liable to involve considerable difficulties for management. The difficulties of operating a two-shift system, say 16 hours a day, are less than those of operating a three-shift system. It is true that the advantages are also less, but very substantial savings could still be obtained, and a two-shift system may be a practicable alternative to a single shift in conditions in which three shifts are not feasible at all. We have seen that a two-shift system would permit the disadvantages of night work for workers to be largely eliminated or at least greatly reduced.

These are some of the opportunities (other than those associated with choice of products and technology, which are discussed in paper No. 7) for providing more employment in the industrial sector in ways that will promote, rather than impair, economic growth. For the various reasons examined thus far, less employment may be provided in the industrial sector of developing countries than it would be remunerative (both to an individual entrepreneur and to society as a whole) to provide, at least if certain difficulties could be overcome. But there is the further point that employment that it would be socially worth while to provide, in the sense that what would be produced would have a value greater than its cost of production to society as a whole, may not be remunerative to private entrepreneurs.

To quote from another I.L.O. publication[1]:

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[1] *Employment and Economic Growth*, op. cit., pp. 137-138. For an interesting discussion of imperfections in labour and capital markets see P. STRASSMANN, op. cit., Ch. V.

> In a market economy employers must closely compare returns and costs measured in terms of money. . . . However, the pricing system will promote economically rational decisions if, but only if, money costs accurately measure real costs, so that what an employer has to pay to employ labour or borrow capital reflects their true scarcity or abundance.
>
> But there can hardly be said to be an organised market or a market price for capital in many developing countries. Finance may be made available from public sources or with a government guarantee for some privileged types of investment in the modern sector at rates of interest lower than would have had to be paid in an open market, while usurious rates may be payable in the traditional sector. While rates of interest for certain types of borrowing may fail to reflect the true scarcity of capital, wage rates on the other hand may fail to reflect an abundance of unskilled labour. Wages have to be looked at from two points of view—as an income and as a cost. As an income, wages in developing countries are often barely, if at all, sufficient to enable even urgent needs to be met. . . .
>
> But if there is much unemployment or underemployment even very low wages may overstate the real cost of employing labour, in the sense of the value of the alternative production there would have been if the worker had not been employed where he is. The value of the alternative production forgone, so far as the activities of the worker himself are concerned, will be nil if the worker was wholly unemployed, and may be very low if he was greatly underemployed.[1]
>
> It will be understood that nothing in this argument suggests that wages regarded as incomes are higher than they ought to be. The argument is that the money cost of employing labour overstates the real cost of doing so.

A good deal of emphasis is laid on this point in paper No. 7, but it is equally relevant to the present paper. If the ratio of labour costs to capital costs in terms of money were lower than it is, entrepreneurs would more often find it profitable to resort to more intensive staffing, better maintenance of expensive equipment and multiple-shift work. Governments may wish to take account in their employment policy of this common distortion of the structure of prices and costs in developing economies. This point is elaborated below.

It may be added that the governments of some developing countries, aware of the hardships often involved in trying to bring up a family in urban conditions on the wages prevailing, particularly for unskilled workers, have acquiesced in, or in some cases taken the initiative in bringing about, rather rapid increases in industrial and other wages. This probably tends to limit the growth of employment opportunities. In a number of situations a hard choice has to be made between more employment or higher wages for those already employed.

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[1] There may be other elements in costs to society that cannot be neglected. Unless wage-earning employment can be provided on the spot, workers will have to move in order to take it up and this will involve costs of transport. If they move to towns, they will have to be provided with somewhere to live, and other forms of social capital. They may also need various forms of training which, however desirable, cannot be provided without costs. All these things will make demands on resources which will constitute real costs to society. [Note taken from text quoted.]

If it is the policy of a government to do all it can to ensure that as much labour is employed in the industrial sector as can productively be employed there, the above analysis suggests that steps taken to implement such a policy should include the following:

(a) Promoting awareness on the part of the managements of industrial enterprises, public and private, of (i) the importance of keeping employment considerations in mind, along with others, when taking decisions relating to the composition of output and the techniques of production [1]; and (ii) the fact that opportunities for the productive employment of labour in industry depend not only on the choice of products and technology, but also on exploring the scope for more intensive staffing, better maintenance of existing equipment and an increase in shift work. In countries where national or regional productivity institutes or management development centres have been set up, these provide channels of approach and technical advice to both public and private industrial managements, and it seems appropriate that in their work considerable emphasis should be given to employment considerations. Otherwise efforts to increase productivity may make for unnecessary redundancy and dismissal of workers; and if these workers cannot find other jobs any increases in productivity that may be achieved are likely to be dearly bought in terms of welfare.

(b) Governments might wish to investigate systematically, in co-operation with employers' and workers' organisations, the reasons why multiple shifts are not more widely employed in industry, with a view to finding ways of overcoming the difficulties that at present stand in the way of making wider use of them.

(c) Again in co-operation with employers' and workers' organisations, governments might wish to try systematically to identify the categories of key personnel shortages of whom constitute major obstacles to the employment of more labour in industry. Supervisors, process planners and maintenance men may be among these categories, but there may be others equally or more important.

(d) Having identified these categories of workers, governments might wish (i) to estimate the numbers in each category who should be trained in order to meet present and foreseeable future needs, and (ii) to organise, or assist entrepreneurs to organise, " crash " training programmes as an emergency measure and longer-term training arrange-

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[1] This point is mentioned for completeness, though the issues it raises are discussed not here but in paper No. 7.

ments to ensure that the supply of personnel in the key categories will keep pace with the demand for them.

(e) Governments which provide tax incentives for the reinvestment of profits might wish to consider counteracting this bias in favour of the employment of capital, rather than labour, by making an increase in a firm's labour force as privileged for tax purposes as investment in additional equipment.

(f) In taking decisions on the size and composition of the labour force to be employed in industrial undertakings in the public sector, governments might wish to base their decisions not on the market prices of capital and labour, but on a system of " accounting prices " or " shadow prices " designed to reflect more accurately the relative scarcity of capital and labour. They might also, through appropriate fiscal measures, give private entrepreneurs inducements to behave as though capital were dearer and labour cheaper than the prices actually prevailing. Such inducements may take various forms. Licensing systems can also be used as a means of applying a certain amount of compulsion in appropriate cases. For example, at the time of applying for a licence to establish a new plant employers could be required to present a strong and convincing case for the techniques they plan to adopt and give information on the sources of supply of machinery, etc. Since these are matters of general economic management, bearing just as much on other sectors as on the industrial sector, they will not be further discussed here.[1]

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[1] See I.L.O.: *Employment and Economic Growth*, op. cit., pp. 138-141, and idem: *Employment Objectives in Economic Development*, op. cit., p. 72. See also A. Qayam: *Theory and Practice of Accounting Prices* (Amsterdam, 1960), and Mahbub ul Haq: *The Strategy of Economic Planning: A Case Study of Pakistan* (Karachi, Lahore, Dacca, Oxford University Press, Pakistan Branch, 1963), pp. 42-45.

Although the subject cannot be pursued here, two difficulties about the " accounting prices " approach may be mentioned briefly. One is the difficulty of determining in a scientific manner accounting prices that would reflect real scarcity in the sense that they would just " clear the market " for capital and labour, leaving neither a shortage nor a surplus of either; a perfect solution to this problem is unlikely to be achieved, but even quite arbitrarily determined shadow prices could make for more rational decisions than the present distorted market prices. A second and perhaps greater difficulty is that attempts to correct the effects of the cost distortion, both in the public and in the private sector, are liable to cost money, or to involve a loss of revenue, to the State. It is all very well to say that employment of more labour would be economically rational in the sense that the additional goods or services produced would be worth more than the social costs of employing the additional labour, but if the additional employment involves money costs that are not covered by the sale of additional goods or services, how is the additional employment to be financed? If it is in the public sector, it will involve increased demands on public funds. Special inducements to private enterprise to employ more labour are liable to involve either tax rebates or special subsidies. Money spent to correct the effects of cost distortions may be very well spent from the points of view both of productivity and of welfare, but such money will have to be found somewhere.

(g) Governments may wish to take due account, in decisions affecting wages, of the effects of wage increases on employment opportunities.[1]

F. *Some forms of international action may be helpful in this connection.*

While a policy to employ more labour productively in the industrial sector would need to be implemented primarily by direct and indirect government action in the country concerned, some forms of international action may be helpful in this connection. These may include the following:

(a) Increasing the emphasis placed, in the work of international technical co-operation missions concerned with management development or productivity improvement, on searching for opportunities for the productive employment of labour in industry.

(b) Increasing the emphasis placed, in the work of such missions concerned with vocational training, on identifying and training categories of key personnel, shortages of whom constitute obstacles to the employment of more labour in industry.

(c) International lending through such agencies as the International Bank for Reconstruction and Development and regional development banks might include the employment potential of various investment projects among the criteria for lending. Lower rates of interest might be charged on loans granted to finance projects that promise larger increases in productive employment than others. In pre-investment feasibility studies of projects carried out by lending agencies careful consideration might be given to alternative and more labour-intensive possibilities of production.

(d) A main reason for underutilisation of industrial capacity in a number of developing countries is the shortage of imported materials, intermediate goods and spare parts (which together might be called " maintenance " imports) due to lack of foreign exchange. This, for instance, appears to be the case in India. Where such bottlenecks are important, it is worth while to examine whether, in providing international capital aid to the country concerned, some shift of emphasis might be called for as between the financing of formation of fixed capital and the financing of expansion of maintenance imports caused by the growth of industrial capacity. With regard to Asian countries it has been observed:

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[1] This subject is further discussed in paper No. 8 below.

> Foreign aid is a way out of this difficulty and has been so used by many countries. But the preference of the donor countries for specific project aid has, on balance, led to a greater expansion of the demand for imported maintenance materials than the increase in the free aid which can be utilised for the purchase of these materials. Thus, when a scarce resource is provided from abroad, the donors do not seem to devote much care to ensuring that the resource is fully utilised.[1]

In such cases a more balanced distribution between specific project aid and capital aid not tied to specific projects could, by making available to the country more foreign exchange for financing maintenance imports, go some way towards bringing about fuller utilisation of existing capacity and a greater immediate increase in employment in the industrial sector, although the longer-term solution would depend much on the development of industries to provide import substitutes, and on export promotion.

(e) An increase in employment in the industrial sector, as in any other sector, will lead to an increase in demand for food. The difficulty of providing a commensurate increase in food supply, especially in urban areas, is often a constraint on the rate of growth of industrial employment. While most developing countries have taken steps to expand their programmes of agricultural development, it will take some time before these programmes can yield the expected additional food output. During this interval, an expansion of international food aid, more particularly through the World Food Programme, could be of material help to those countries in raising the level of industrial employment without risking inflation.

(f) For countries in the process of industrialisation where labour is plentiful and capital scarce, the comparative advantage of international trade in manufactures normally lies with products requiring relatively more labour and less capital. It has been observed that—

> there is evidence that comparative cost conditions are changing to the advantage of the newly developing countries as regards the production of certain manufactured goods, particularly those requiring a good deal of labour, such as textiles, clothing, ceramics, pharmaceuticals, light electrical material and some types of durable consumer goods such as bicycles and sewing machines.[2]

The development of industries manufacturing labour-intensive products for export markets to earn more foreign exchange would at the same time provide more opportunities for industrial employment that promote economic growth. The developed countries could do much to help realise this potential comparative advantage by admitting manufactured exports of developing countries more freely to their markets.

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[1] *Economic Survey of Asia and the Far East*, op. cit., p. 41.

[2] *Employment Objectives in Economic Development*, op. cit., p. 127.

(g) As indicated above, because of the lack of adequate technological research, the most appropriate technology for countries with an abundance of labour and scarcity of capital may simply not be known. In order that the technologies adopted in industrialisation may correspond more closely to their relative factor endowments, these countries will have to make special efforts to promote technological inventions and innovations directed at saving capital and making more productive use of the available labour. There is, however, a limit to national efforts. Furthermore, many technological developments of this nature might be expected to meet the similar needs of a number of developing countries. As emphasised in paper No. 7, there seems to be, therefore, a particular need for concerted international action to foster such inventions and innovations, including increased technical co-operation by international agencies in these fields of activity.

7. PROGRESSIVE INDUSTRIAL TECHNOLOGY FOR DEVELOPING COUNTRIES

INTRODUCTION

By the technology of an industry, for purposes of this paper, is meant the processes, plant, machinery, equipment and tools used in it. There are some industries in which, for practical purposes, there is little choice of technology, or in which the superiority of one technology over all alternatives is so great that it remains superior throughout the whole range of variation in size of markets, in wage rates and in interest rates prevailing in the world. But such a state of affairs is exceptional. In most branches of industry a range of choice of technology exists; and even where this is not true of certain central production processes it is usually true of a variety of ancillary processes such as materials handling, internal transport and packaging.

Those concerned with the industrialisation of developing countries —private industrialists, the directors or managers of public industrial establishments and officials in ministries of economics, planning, industry or finance who guide industrial development by issuing or withholding licences, permits or loans—are anxious to choose or encourage the choice of the technology best suited to the needs of the country concerned. The first part of this paper discusses certain factors affecting the choice of industrial technology; the second part discusses sources of appropriate technology and ways of increasing its availability; and the final section examines measures that can be taken to promote the introduction of progressive technology through the action of industrialists, governments and international organisations.

I. SOME FACTORS AFFECTING THE CHOICE OF INDUSTRIAL TECHNOLOGY

There has been much controversy over the relative merits of capital-intensive and labour-intensive technology in developing countries. On the one hand, it may be felt—

(*a*) that the building up of an industrial sector employing the most modern and advanced technology is the hallmark of an economically developed country or of one determined to take its place as rapidly as possible among these countries;

(b) that it is necessary to invest with the future in mind and that machines and equipment which are not of the latest design will rapidly become obsolete;

(c) that advanced technology exposes all who come into contact with it to the forces of change and development, thus exerting a pervasive influence on ways of life throughout society and in particular enabling managements and workers to acquire the technical skill and knowledge indispensable in a modern economy;

(d) that the industries with the greatest growth potential are those employing advanced technology;

(e) that a high degree of capital intensity permits large profits to be made and a large proportion of these to be ploughed back to promote faster growth.

On the other hand, it may be felt—

(a) that advanced industrial technology has developed in response to the needs, and is designed to operate in the conditions, of industrially advanced countries with large markets, relative abundance of capital and entrepreneurial and managerial skills and a shortage of labour;

(b) that transplanting industrial technology to countries where it will operate under conditions for which it was not designed can be an expensive mistake;

(c) that countries should not seek to make a sudden, sharp break with their past but should build on the existing foundations, developing and adapting traditional skills, knowledge and techniques;

(d) that, where capital is scarce, the adoption of capital-intensive technology will have the effect of concentrating it in a few large plants while keeping the rest of the economy starved of capital, and that this accentuates the dualism characteristic of developing economies and societies, sharpening the contrast in living standards, opportunities and outlook between the modern and the traditional sectors and limiting the numbers who can be absorbed into the modern sector and exposed to its modernising influences;

(e) that if, indeed, capital-intensive technology does enable a few large modern plants to make large profits this does not mean that the total profits, public and private, for the economy as a whole are necessarily greater, or that more resources will necessarily be invested, than would have been the case if capital were spread more widely and thinly.

These arguments cannot all be examined in detail in this paper but comments will be made on some of them.[1]

It is sometimes thought that anyone who advocates the selection of labour-intensive products and methods in developing countries is trying to fob them off with something inferior. It is indeed highly likely that industrial processes in the future will in all countries come to be carried out increasingly by machines rather than by men. When one considers the comparative advantages of men and machines, most of the advantages in industrial processes seem to lie with machines.[2] Where fabrication is concerned, men can shape and combine materials with simple hand tools by such actions as cutting, striking, twisting, rubbing and stirring. However, men cannot attain great speed or high precision, and they can work only within certain temperature ranges and in the absence of poisonous fumes. Machines can do all these things and more, faster, with greater precision and in a wider range of conditions. So far as transport is concerned men can move limited weights rather slowly over rather short distances; machines can move heavy weights fast over long distances. So far as control is concerned, men can look, listen, feel, smell and taste; but here again their speed and accuracy are limited. Nor do they respond directly to changes in voltage, humidity or chemical states. Machines can do all these things. Men still have the advantage over machines in analysis—in breaking information into components for selective recombination with other data. And human beings have a monopoly in personal services, that is in situations where the impact of one personality on another is important. In industry other kinds of work than those just cited seem likely to be done increasingly by machines.

But this has not happened yet even in the developed countries. The transition to more or less complete automation of industry, if it ever comes about, may take several generations. During the transitional period it is reasonable and indeed necessary, in the selection of industrial products and processes, to take account of differences between countries in factor proportions, factor prices and size of markets.

This suggests that countries in which capital is scarce and dear and labour cheap and abundant would do well, in planning their industrial development, to look for ways of using more labour and less capital.

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[1] For a review of arguments used in this controversy up to the time of its publication (and these arguments have not changed greatly in more recent years) see " Some Problems of Investment Policy in Underdeveloped Countries ", in *International Labour Review* (Geneva, I.L.O.), Vol. LXXVII, No. 5, May 1958.

[2] The points which follow have been made by P. STRASSMANN: *Technological Change and Economic Development*, op. cit.

This is not a matter of being content with inferior, old-fashioned ways of doing things. It is a matter of making use of an asset—abundant cheap labour—that developed countries do not have, an asset which gives developing countries an advantage, or a potential advantage, in many lines of production. It seems likely that the least-cost combination of labour and capital in an industrial process in a developing country will often be one that provides more employment per unit of output than the least-cost combination for the corresponding process in a developed country. This is especially likely to be the case if the developing country has a comparatively small market—and of course the size of a market depends not so much on the size of a population as on its purchasing power.

Interesting work on the optimum combination of labour and capital at different interest rates and wage rates has been done by the Netherlands Economic Institute.[1] Among these studies are three which compare *(a)* hand files with small electric grinders; *(b)* centre, turret and automatic lathes; and *(c)* production of window frames with planing and moulding or tenoning processes.

The choice of process depends both on the relation between wage rates and interest rates and on the size of the market, which determines the length of production runs. With short production runs it pays even the developed countries with a high ratio of wages to interest to use the most labour-intensive methods. In developing countries with a low ratio of wages to interest the most labour-intensive methods will be the cheapest except with a volume of production substantially greater (from 1.7 to 15 times greater in the above-mentioned studies) than in the developed countries.

But the full strength of the case for using abundant labour where possible to save scarce capital in developing countries may not be reflected in comparative cost figures alone, for the costs of leaving human resources idle are often not brought into, or are not accurately reflected in, the calculations of planners. A pricing system will promote economically rational decisions if—but only if—money costs accurately measure real costs, so that what an employer has to pay to employ labour or borrow capital reflects their true scarcity or abundance.

It is clear that money costs and prices in developing countries often do not accurately reflect real costs. In particular, capital often appears cheaper than it really is (finance may be made available from public sources or with a government guarantee for some types of investment in the modern sector at rates of interest lower than would have had to be paid in an open market), and labour often appears dearer than it really is (the real cost of employing a hitherto unemployed or greatly underemployed worker, in the sense of the production foregone by withdrawing him from what he was previously doing, may be almost nil).[1] In addition, the cost of foreign exchange often appears less than it really is (if countries have over-valued currencies but do not want to devalue, foreign exchange has to be rationed and allotted to successful applicants at a price below what they would have been willing to pay rather than go without). These cost distortions make it rational for private enterprise, and the managers of public enterprises in so far as they think primarily in terms of maximising the profits or returns of their own undertakings, to choose a product mix and a type of technology that use more capital and foreign exchange and less labour than is in the best interests of the country as a whole. This has led to the suggestion that governments, for planning purposes, should use not market prices but " shadow prices " reflecting the best estimates they can make of the real costs of different resources from the social point of view; and that governments might also wish, through appropriate fiscal measures, to give private enterprise inducements to behave as though capital and foreign exchange were dearer and labour cheaper than the market prices actually prevailing.[2]

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[1] See the series of reports on alternative techniques of production (Rotterdam, various dates).

The case for making sure that all the labour that can economically be employed in the industrial and other sectors is employed is strengthened by the human and social costs of unemployment and underemployment, which have been stressed in paper No. 6. This would mean, as suggested in that paper, that it would contribute to the general economic and social welfare if private enterprise, and governments in both their own operations and their policy towards private enterprise, attached more weight than they do at present to employment considerations when taking or guiding decisions regarding the choice of industrial technology. This does not of course mean that labour-intensive technology should always be preferred to capital-intensive technology. But perhaps the following classification might be helpful as a guide to policy. Industrial and other projects may be grouped in principle into four categories:

Category A projects: These are projects in which labour-intensive, capital-saving technology, with existing methods and prices, yields money economies in production. In all such projects there is a clear case for choosing labour-intensive technology; the selection of capital-intensive technology for non-economic reasons, such as prestige, would involve an evident misuse of resources.

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[1] See on this subject paper No. 6, especially p. 195.

[2] See paper No. 6, p. 197, subparagraph *(f)*.

Category B projects: These are projects in which labour-intensive techniques, when used carelessly or in traditional fashion or without adequate supervision, involve rather higher money costs than more capital-intensive techniques would do, but in which there are opportunities (through better management, work study, better design of simple tools, etc.) to adapt labour-intensive techniques to produce as cheaply as, or more cheaply than, with more capital-intensive techniques. There is a clear case for doing all that can be done at reasonable cost to transfer category B projects into category A, and then to carry them out by labour-intensive methods.

Category C projects: These are projects in which, even when all feasible measures to improve the efficiency of labour-intensive techniques have been taken, such techniques still involve higher money costs of production than would more capital-intensive methods, but do not involve higher real costs (i.e. they would be cheaper if shadow prices accurately reflecting real costs could be used instead of market prices). The simplest way of counteracting the cost distortion would probably be to raise interest rates, or at least to make sure that finance is not available on subsidised terms.[1] It might also be possible to operate something in the nature of a negative employment tax or a subsidy for the employment of labour; but there would be obvious possibilities of abuse, making such a system difficult for developing countries to administer, and governments would have to decide where the money was to come from.[2]

Category D projects: The difference between these and category C projects is that the cost differential in favour of advanced technology is greater than the cost distortion produced by the use of market prices instead of shadow prices. There is no case on economic grounds for using anything but capital-intensive technology in category D projects. A question may arise as to whether a country in which capital is very scarce should have projects of this kind at all; but a certain number of such projects, even in very primitive economies, may be conducive to economic and social welfare, permitting for example the exploitation of natural resources such as oil or deep-level minerals accessible only by capital-intensive methods.

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[1] This is not to suggest that governments should pay a higher rate of interest on funds they borrow from advanced countries or through international agencies, but rather that if they lend such funds to private enterprise they might maintain a profitable margin between their borrowing rates and their lending rates, while if they use such funds in the public sector they might for planning purposes use a shadow rate of interest. It is recognised that raising interest rates on loans to private industrialists might conflict, or appear to conflict, with a policy of encouraging rapid industrial development; but funds no longer used to subsidise the capital costs of certain industrialists could be used to promote industrial development in other ways.

[2] See also some suggestions in I.L.O.: *Employment Objectives in Economic Development*, Studies and Reports, New Series, No. 62 (Geneva, 1961), p. 72.

This classification in four categories may seem somewhat theoretical and schematic, but an attempt to assign industrial and other projects included in, or competing for inclusion in, a development plan to these categories, and to treat them accordingly, might well be useful for planners, private as well as public.

A country that chose to confine highly capital-intensive technology to category D projects might thereby save much capital, which could be used to provide more jobs and/or to raise the productivity of labour in category A, B and C projects, resulting in a more even spread of capital throughout the economy and a progressive adaptation of technology to growing markets, knowledge, skill and availability of capital—hence the use of the word " progressive " in the title of this paper.

Below are given some examples, drawn from the experience of I.L.O. management development and small-scale industry experts, of cases in which the transplanting of advanced industrial technology to conditions for which it was not designed does not seem to have given good results.

(a) *Plastic Shoe Manufacture*

One country imported two plastic injection-moulding machines costing $100,000 with the moulds. Working three shifts and with a total labour force of 40 workers they produced one-and-a-half million pairs of plastic sandals and shoes per year. At $2 per pair these were better value than leather footwear at the same price. But it is doubtful whether the country as a whole benefited. The result has been that 5,000 artisan shoe makers have lost their livelihood and the markets for the suppliers and tanners of leather, hand tools, cotton thread, tacks, glues, wax and polish, eyelets, fabric linings, laces, wooden lasts and cardboard boxes have been reduced, since none of these is required for plastic footwear. As all the machinery and the material (P.V.C.) has to be imported, whereas the leather footwear was based almost wholly on indigenous materials and industries, the net result has been a decline in employment and in real income within the country.

(b) *Ceramic Plant*

A ceramic factory making floor and wall tiles formerly imported its hand-operated presses. As a result of close co-operation with local small engineering workshops it was able to have replacement presses made locally, using castings moulded from scrap metal in small foundries and machined on general-purpose lathes and drilling machines. The tiles themselves were made from indigenous clay deposits, and fired in kilns composed mostly of local refractory bricks. Thus output, income and employment were stimulated in a number of other industries and trades, e.g. scrap metal, foundry, carbon, refractory, engineering, quarrying.

This multiplier effect was just beginning to make itself felt when it was decided to build a modern large-scale ceramic plant in place of the existing one, with fully automatic presses, continuous tunnel kilns, etc. This equipment required special steels and engineering skills, refractories with a high aluminium-oxide content, and technical know-how, none of which were available locally (or were likely to be for many years). Therefore they had to be imported. Also, because of the high speed of operation, very malleable clays were required, and these too had to be imported. In the end the consumer got a poorer-quality, dearer product because the breakage rate was higher owing to (i) inadequate temperature control in the tunnel kilns (technological inexperience), and (ii) clumsy handling during glazing operations (inadequate supervision in the new factory). Employment and net output declined in the ceramic and allied industries listed above and the country's trading deficit widened.

(c) *Tanning Industry*

A tanning industry project in one country envisaged building a small model tannery to act as a training centre and to demonstrate new techniques, together with a number of new buildings to rehouse existing tanneries, thus improving working conditions and separating the industry (with its obnoxious smells) from living quarters. The total capital costs were projected as $2½ million for an output of $15 million per annum (a high capital productivity). The buildings and some of the machinery could be made locally, so the import content was small. Demand for leather was growing at 5 per cent. per annum and labour productivity was expected to rise at this rate owing to improved methods and conditions; thus the total labour force in the industry of 3,000 would remain the same.

This project was rejected on the ground that it was not modern enough. In its place was substituted a scheme for a large government-owned tannery estate, costing $15 million, equipped with the latest imported machinery and with a total capacity 50 per cent. in excess of the existing firms. Labour productivity would be doubled, but the savings in wages would be more than offset by higher capital (interest and depreciation) costs if a shadow interest rate were used. The productivity of the capital employed would only be 25 per cent. of the anticipated level in the first project. Employment in the industry would be halved, the existing equipment made obsolete and the import bill increased by more than $8 million. The present firms would be broken up and experienced owners made redundant. Little improvement in quality could be expected, because further foreign exchange to buy better hides and tanning materials (which together with technical know-how were the primary determinants of quality) could not be afforded. In international terms the country would end up not with the most up-to-date process, but with an expensive " white elephant ", because heavy sole leather and even some upper leathers were being replaced rapidly in world markets by synthetic materials.

The more modest scheme was thus not only more appropriate for the particular internal circumstances of this country but also gave it greater flexibility to take advantage of world technological developments when it had the necessary resources (e.g. a petro-chemical industry).

Finally, two examples may be given of the successful use of technology in industrial projects (in one case advanced technology) well adapted to the needs and conditions prevailing in the developing countries concerned.

(a) *Manufacture of Sewing Machines*

An Asian country that had formerly imported its sewing machines decided to promote its own sewing machine industry. A nucleus already existed in the small workshops manufacturing replacement parts for imported models. Profiting from the temporary protection afforded by import restrictions, local entrepreneurial initiative quickly appeared to co-ordinate and expand the activities of these specialised workshops and to set up assembly units. In a few years the industry, equipped with general-purpose lathes and drills, was turning out models at 60 per cent. of the price of previous imports. The local sewing machines had a more limited range of operations, and were less accurate, but because of their lower price they had opened up a new market among small-scale clothing and footwear establishments, thus increasing their efficiency. By 1966 import restrictions could be relaxed and the industry was strong enough to have established a thriving export trade to neighbouring countries.

(b) *Fibre-Board Plant*

A fibre-board plant was set up in an African country. This cost $2 million and employed only 120 workers directly, because the higher pressures and great bulk involved required very heavy machinery. However, it processed the residue of sugar-cane and maize stalks, which would otherwise have gone to waste. Thus the value added during the process was high and it provided additional incomes to the farmers. The finished product was a good, cheap substitute for certain kinds of wood for furniture and housing. This wood had previously been imported, so foreign currency was also saved. The project therefore served the national interest in several respects.

II. SOURCES OF APPROPRIATE TECHNOLOGY AND WAYS OF INCREASING ITS AVAILABILITY

Various economic and social objectives of technical progress have been indicated and some general guidelines have been suggested which might be borne in mind by those who frame economic policy affecting public and private investment decisions. But the problem does not cease there. The optimum choice of technology can only be made if a full range of alternatives is available. Unsuitable techniques are often applied because there is nothing else on the market except machinery designed to meet other needs. The full spectrum of scientific and technical knowledge must be brought to bear. The brand-new, the present day and the experience of the past are all potential sources which should be tapped. Some sources are examined below in more detail and some ideas put forward as to how their yield can be increased by international action.

New Designs

The most effective means of overcoming economic underdevelopment would be to apply accumulated scientific knowledge to the solution of the specific problems of the developing countries. There is undoubtedly a great need for original designs which will incorporate recent inventions but at the same time take account of the scarcity of capital and of certain managerial and operative skills in the developing world. Innovation is required so that local raw material can be substituted in certain processes for the different types which are imported at present. Varying climatic conditions may demand new solutions to familiar problems. In India and Britain working parties have been formed to undertake this research and the United Nations Advisory Committee on Science and Technology is keenly interested in the problems of adaptation of designs and methods. Much valuable pioneer work has been done by specialist institutes like the Tropical Products Research Institute in London.

Technological research institutes are now being set up in some countries with assistance from the Special Fund component of the United Nations Development Programme. The Advanced Technical and Vocational Training Centre in Turin is expected to contribute in this field, as have the productivity centres and small industry institutes which the I.L.O. is assisting in various parts of the world. But only the surface of the problem is being scratched. More research of this kind is urgently needed, preferably within the developing countries themselves so that it is based upon first-hand knowledge of the local situation. Examples of techniques on which further research is needed are the use of solar heat to distil fresh water from salt water, and as a source of energy for industrial purposes; the processing of date palm fibres to replace wool and hair in upholstery stuffing; and the extraction of creosote and charcoal from the husks and shells of coconuts, and biological insecticides from coconut oil.

Modern Technologies

As emphasised previously, modern technology can play a part. Not to use the latest techniques at all would be just as wasteful as to use them indiscriminately. What types are likely to pass through the screen that has been proposed? Four main groups can be distinguished. The first consists of technical know-how with little or no capital element. Improved ways of making or growing things as a result of a deeper understanding of the chemical, physical and biological properties of products and materials fall into this category. The quicker this knowledge is incorporated into current practice the better, and extension services and demonstration units have vital roles in its dissemination. There would appear to be no major economic obstacles, though social resistance may be encountered.

The second group consists of technology where the tool element can be easily separated from the labour element. One particular process in a series of operations may have to be performed by a particular machine if consistent quality and precision in the final product is to be maintained. The ancillary operations could be carried out by hand methods if labour were abundant and cheap.

The third category covers machines which replace non-existent human skills, or skills which would demand the use of very expensive educational facilities.

The fourth category embraces all those modern technologies that may be the only effective means of exploiting a country's physical resources, which would otherwise lie idle and which form the basis of other indigenous industries. An example might include the use of colour charts, penetrometers and triaxial compression testing machines for measuring the proportion of soil and clays, leading among others to the manufacture of improved ceramic products.

Long-Established Designs

There may still be very great scope for the use of equipment which has been superseded in industrially advanced countries because it is no longer economic under present-day conditions in such countries, but which may be employed profitably in the small industries and craft workshops that provide the bulk of consumer goods and services in developing countries. In these countries the most primitive production methods still exist, even alongside large modern industries. In some countries the potter's wheel is still unknown, wood-turning lathes are turned by hand with a bow; bricks are fired in kilns that have to be dismantled after every firing. Many designs exist in industrially developed countries which are not to be found in catalogues and may have to be dug out of the archives of patent offices and of long-established machinery manufacturers. Trade associations could carry out such sifting and collating, sponsored by United Nations or bilateral aid funds. The designs could be sent to research institutes in developing countries, which would disseminate the specifications and drawings to workshops and manufacturing firms and assist them with development.

The major international companies setting up subsidiaries in developing countries could contribute considerably in this. A large electrical group in the Netherlands has shown the way by establishing at Utrecht a pilot radio assembly plant for training future managers and technicians to man their overseas factories. In this plant only simple and commonly available tools are used and the complete process is " packaged " for reproduction abroad. Some 20 countries are now producing radios using techniques developed at Utrecht.

The Intermediate Technology Development Group in the United Kingdom, formed in 1965, is gathering substantial support and has already provided assistance and advice to a number of countries in Africa, so far mainly in connection with rural activities. It is currently producing an illustrated buyers' guide to British tools and equipment, entitled *Tools for Progress*, which lists 31 categories of inexpensive equipment and tools under the main headings of agriculture, metalworking and machine maintenance, power, and water supply. Subheadings include handicrafts and small-scale industries, and transport and handling.

The examples given above are indications of what might be appropriate " new " technologies to replace existing ones. These should be regarded as steps and not platforms. In each industry, improved techniques need to be introduced successively over the years so that productivity is raised progressively. Some concrete examples of such processes and techniques are given below.

(a) Bakery industry. Steam-pipe ovens which ensure an even dispersion of heat by means of coiled steam pipes; drawplate ovens in which the loading and unloading are speeded up by putting the plate of the oven on wheels and rollers; T-arm kneaders in which a single reciprocating arm kneads the dough in a rotating mixing bowl. This equipment is more advanced and efficient than bricklined, open-flame ovens and hand mixing, but is much less capital-intensive than turbo-radiant travelling ovens or continuous mixers.

(b) Ceramic industry. Hand-operated jiggers for forming plates, semi-automatic presses for tiles, gravity-fed extruders for pipes. These are all superior to traditional methods but less expensive than tunnel kilns and fully automatic equipment.

(c) Shoe industry. Simple sewing machines (first introduced in 1859) for stitching the sole to the upper and insole. This is quicker than hand stitching but may be more appropriate than vulcanising or injection-moulding equipment for soling in some countries.

Second-Hand Machinery

This is really a special case of the previous category. Second-hand machinery is often less complex than present-day machinery, so it is easier to operate and maintain where certain skills or experience are lacking. It is usually much cheaper than new equipment. Thus a given investment fund may go further and the output in relation to the capital input will be high. It can usually be adapted and reproduced more readily in the indigenous engineering industries. There seems to be little doubt that imported second-hand machinery would find a ready market and, if selected judiciously, could raise productivity and efficiency over a wide area.

Some of the widespread resistance to second-hand equipment stems from a fear of being landed with worn-out, obsolete machines, as well as a rejection of what seems to be " second-best ". These inhibitions may weaken when it is realised what a large market exists in the most advanced countries for this surplus equipment. Indeed, in certain countries the sale of second-hand equipment exceeds that of new. For example, in the United States, whereas " the dollar value of new metal-cutting and metal-forming machines sold exceeds that of the second-hand, the annual turnover in number of units sold is greater for the latter than for the former: the ratio is currently about 2 : 1 ".[1] All in all, it would seem to be preferable to prevent abuse and disappointment by more rigorous inspection and by dealing only through reputable specialised import-export agencies in this field, than to forgo the potential advantages of second-hand plant altogether. An example of comparative costs when using a second-hand and a similar new machine tool is given in tables I and II below.

TABLE I. COSTS AND OUTPUT OF ALTERNATIVE SOLE-STITCHING MACHINES

	Second-hand model	New model
Price	$1,000	$5,000
Depreciation period	5 years	10 years
Interest rate on loans	15 per cent.	15 per cent.
Yearly output	50,000 pairs	70,000 pairs
Number of operatives	1	1
Annual wage cost	$500	$500
Fuel and power costs	$50	$50
Light and floor space and insurance	$50	$50
Repairs and maintenance [1]	$75	$100

[1] Servicing costs are higher for the new model because foreign engineers and spare parts are required, whereas the older, simpler machine can be repaired by local personnel.

This example is based upon actual costs, which have been rounded off for simplicity. Thus, despite the fact that the new sole-stitching machine has a 40 per cent. greater productivity and double the anticipated working life of the older model, its cost per pair is 80 per cent. higher. This is because capital costs are high and wages low. In this exercise material costs are assumed to be constant.

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[1] United Nations Centre for Industrial Development: *Report of Expert Group on Second-Hand Equipment for Developing Countries*, 7-22 December 1965 (New York, 1966), p. 5.

TABLE II. ANALYSIS OF DIRECT LABOUR, FUEL AND CAPITAL COSTS WITH ALTERNATIVE SOLE-STITCHING MACHINES

(U.S. dollars)

	Second-hand model	New model
Depreciation and interest	275	875
Fuel	50	50
Light, floor space, etc.	50	50
Servicing	75	100
Labour costs	500	500
Total . . .	950	1,575
Cost per pair . . .	0.0190	0.0225

III. Measures to Promote the Effective Introduction of Progressive Technology

This final section is concerned with measures which can be taken by industrialists, governments and international organisations to ensure optimum selection of appropriate industrial technology.

Industrialists and Employers' Organisations

Many industrialists in developing countries and elsewhere have set up industries without having had previous industrial experience and without formal management knowledge. Except in the most advanced companies, costing and accounting systems are rarely sufficiently developed to provide accurate analysis of costs on which the economic performance of existing or proposed investments can be judged. Lacking also technical knowledge and information about alternative processes or plant, many industrialists buy their equipment on the recommendation of the machinery manufacturers or their salesmen, who may not be concerned to ensure that it is the most suitable for the conditions it will have to operate in. As a result they may find themselves saddled with plant that is uneconomic, even from the point of view of the firm. This can also happen in the case of public undertakings.

It is therefore in the interests of industrialists themselves to ensure—

(a) that they fully understand the conditions in which they have to operate, including the relative costs of the factors of production. This is best ensured by sound management development and training at all levels;

(b) that they obtain full information on the choice of processes and plant available to them and expert advice on its selection.

Employers' organisations and trade associations might form documentation centres providing technical information likely to be of interest to their members, and might arrange for the provision of expert services, to be paid for by the users, when major purchases are involved.[1]

Governments

It has been stated earlier that it lies in the hands of those responsible for economic planning to ensure that the real social costs of investment decisions are known and understood. Training courses for planners in feasibility studies and cost-benefit analysis techniques to increase the rationality of investment decisions are being provided by U.N.I.D.O. It must also be ensured, by legislative, fiscal and other measures, that those responsible have the means of enforcing decisions that are in the broad national interest. Such measures might include—

(a) the formulation and publication of industrialisation policy statements;

(b) higher official interest rates on capital investment to raise the price of capital vis-à-vis labour costs. This would tend to bring more labour into productive employment and increase the propensity to save[2];

(c) measures to ensure that importers have to pay the real cost of foreign machinery and materials and that a proper evaluation is made in feasibility studies;

(d) state-financed hire purchase and rental schemes with lower interest rates for locally made equipment and imported second-hand machinery;

(e) encouraging the setting up or expansion of indigenous machine-building industries, initially to provide capital equipment of a simple type that can later be developed and diversified into the manu-

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[1] In Iran the Industrial Management Institute supplies experts to accompany industrialists going abroad to purchase plant and machinery. Substantial savings have been effected in this way. See I.L.O.: *Regional Seminar on Marketing, Employment and Management Problems of Industrialisation in Countries of the Near and Middle East and North Africa—Conclusions and Papers.* Management Development Series, No. 2 (Geneva, 1965) (mimeographed).

[2] It is in no way suggested that governments should pay a higher interest rate on loans from international or bilateral sources.

facture of more advanced equipment. Associated with this might be rewards for local inventions and patent protection for adaptations of foreign designs;

(f) the formation of customs unions with other States at similar stages of development and with complementary resources. These would encourage a new international division of labour and a competitive stimulus for efficiency, while avoiding one-sided encounters between rich and poor nations in the fields of international trade and technology;

(g) setting up central documentation and information centres to keep track of past and current technical developments throughout the world, working in liaison with international and other national services;

(h) subsidising research institutes attached to industry associations, especially for the development of appropriate technologies;

(i) the provision of service institutes and common facility services, possibly on co-operative lines, for small industries and artisan workshops, which would provide extension services and technical training in the use of new equipment;

(j) the provision of vocational and technical education and training at all levels in conformity with the planned needs for manual, technical and managerial skills. Firms setting up their own training facilities might be provided with financial assistance.

Action by International Organisations

Few developing countries have the resources to undertake the steps necessary to ensure the optimisation of their industrial technology without assistance from outside. Several international agencies within the United Nations system are deeply involved in the provision of technical co-operation services in most of the fields mentioned above as being suitable for government action. Proposals for action by international organisations for the promotion of progressive technology might include—

(a) The setting up by U.N.I.D.O. of a central documentation and information centre on industrial processes, plant and equipment providing for each industry information on the range available to suit different conditions of operation and levels of industrial development. Advice on selection could be provided to government centres and industry associations.

(b) Assistance to industrial research institutes in the development of suitable processes and plant. U.N.I.D.O. is already active in this field.

(c) Assistance in the establishment of service institutes, common facility services, and co-operatives for small and artisan industries. The I.L.O. is providing this kind of assistance.

(d) Assistance in vocational and technical education and training and management development. U.N.E.S.C.O. and the I.L.O. are providing such assistance.

CONCLUSION

Whether action along the above lines will be taken depends in the final analysis on how convincing a case can be established for the arguments which have been advanced in this paper. Where they have been applied in the field the results are promising. They appear to open up new avenues for a dynamic attack on poverty in the developing countries, in which the progressive and widespread introduction of new methods (new compared with the traditional ones) could lead to a better use of the current resources of these countries and achieve a more rapid and sustained growth to be shared by the whole people.

8. WAGES AND INDUSTRIAL DEVELOPMENT[1]

INTRODUCTION

The success of a country's efforts to promote industrial development will depend partly upon the level, structure and rates of increase of wages and salaries.[2] These will be among the factors that determine whether the country's industries, actual or potential, have an advantage or disadvantage compared with industries in other countries competing for sales in the home or foreign markets. They help to determine the distribution of resources between consumption and investment; they also have much to do with the degree of success of a country's industrial sector in attracting, retaining and adequately motivating the managerial, professional and technical staff and skilled and less skilled workers needed for industrial development.

In market economies the impact of market forces and collective bargaining on the level, structure and rates of increase of wages cannot be controlled but can be influenced by governments. It is becoming widely recognised that government policy influences wages in a variety of ways and that decisions about wages must take into consideration the indirect effects they will have in promoting or retarding economic growth and industrial development. In other words, the governments of newly industrialising countries are coming to feel the need for a wage policy integrated into their over-all plans for economic, social and industrial development.

A national wage policy must be concerned with all sectors of the economy, but has particularly important implications for the industrial sector because—

(a) This sector typically relies much more heavily than others on wage-earning labour.

(b) Industrial development thus increases the importance of wage-earning employment.

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[1] This is one of the subjects discussed in I.L.O.: *Report of the Director-General*, Report I, International Labour Conference, 50th Session, 1966, Part I: *Industrialisation and Labour* (Geneva, 1966), pp. 52-59.

[2] In the rest of this paper the term " wages " is taken to include salaries; but it is well to bear continuously in mind that the level and structure of the remuneration of managerial and technical staff may be of special importance in industrialisation programmes.

(c) The industrial wage-earning labour force is the main point of impact of modern technology and organisation on traditional society. To the extent that it promotes or retards the successful adaptation and utilisation of the labour force for industrial development, wage policy or the lack of it has a major influence in promoting or retarding dynamic change throughout the economy and society.

(d) The handling of wage questions has a substantial bearing on the number of industrial disputes and on the climate of industrial relations, and hence on the level of productivity in so far as this is affected by these factors.

Having a wage policy means deciding on at least two things: first, what kinds of wage movements a government will encourage or discourage, and second, what instruments it will use to influence wages. Many governments of both developing and developed countries cannot be said to have a wage policy in the sense of having thought out and formulated their views on these two questions. Many probably have not felt a need to do so. But a national wage policy may well be considered more necessary and more feasible in developing countries than in developed ones. It may be considered more necessary because all, or nearly all, governments want to be able to exert an influence over such things as the rate of investment, the level of prices, the balance of payments and the volume and structure of employment. These matters are influenced in various ways, notably through monetary and fiscal policy, but also through decisions affecting wages. The governments of developed countries have at their disposal a wider range of instruments other than wage policy for exerting such an influence than have the governments of developing countries, many of which do not have the institutions upon which fiscal and monetary policies depend. Lack of a wage policy thus probably leaves a bigger and more serious gap in developing than in developed countries in the range of instruments available to governments for guiding economic development and implementing economic plans, including plans for industrial development. It may be more feasible for the government of a developing country to apply a national wage policy if only because a larger proportion of all wage and salary earners in the country are likely to be government employees than would be the case in a country with a developed market economy; and, as an employer, a goverment has much influence over wages in general.

In deciding on the objectives and instruments of wage policy, governments should take full account of the views of representative organisations of employers and workers, and should consult them for the purpose. Decisions on these objectives and instruments raise a number of difficult questions about which not nearly enough is known. At its 48th Session, in 1964, the International Labour Conference adopted a resolution concerning minimum living standards and their adjustment to economic growth which called, among other things, for a programme of research that would help to throw light on these questions. Work on this programme is proceeding. In the meantime an exchange of views and experience on the objectives and instruments of wage policy in the context of industrialisation would be valuable.

OBJECTIVES OF WAGE POLICY

If it is accepted that important objectives of wage policy are to ensure that the general level, the rates of increase and the structure of wages and salaries should be such as to promote and not retard a country's industrialisation efforts, what are some of the major considerations to be borne in mind in seeking to influence wages?

The General Level of Wages

As regards the general level of wages, such propositions as the following might command a wide measure of agreement:

(1) The general wage level should be high enough to call forth a sufficient supply of manpower for industrialisation, including the building up of the necessary infrastructure.

(2) It should be high enough, as a minimum, to meet the basic needs of these workers in the industrial environment. From the point of view of promoting industrial development this is necessary to ensure that they can work efficiently; but it is also—and basically—a matter of giving due consideration to the human needs of workers as men and women and not merely as factors of production.

(3) The general wage level should also ensure workers, over a period of time, a fair share in the fruits of economic progress, giving them a level of living that maintains a reasonable relationship to that of other sections of the community, including farmers, peasants and entrepreneurs. Once again, this is partly a matter of ensuring that industrial workers are sufficiently satisfied with their position in relation to that of other social groups to constitute a stable, committed and productive labour force, but basically it is a matter not of expediency but of social justice.

(4) The general wage level should take due account of capacity to pay, capacity to meet foreign competition in home and export markets and capacity to provide productive work for a rapidly growing labour force which in many countries already includes a great many unemployed and

underemployed. It seems that the degree to which it is possible to expand employment depends to a significant extent on the level of the wage paid to newly employed workers and that in a number of situations a choice will have to be made between more employment or higher wages.

Such propositions as these are easier to formulate than to apply, and in some situations their compatibility may be called in question and compromises may have to be made.

The "Room for Wage Increases"

The practical problem confronting a government is likely to present itself not so much in the form of the question " What would be the optimum general wage level for this country? " as in the form " What room is there for wage increases in the situation in which this country finds itself this year? " The main source of wage increases is, of course, increased production. Unless there is an increase in the supply of goods that wage earners buy, higher money wages will not lead to higher living standards—they will raise prices, or reduce employment. Governments that have adopted economic development plans or programmes have necessarily, in the process of so doing, taken a view as to the rate of increase which they expect or intend to promote in the national income and in its main components. Plans often go wrong, and unrealistic plans may be of no help in making sensible decisions on wage questions. But a plan that is realistic at the time it is drawn up (even though it will have to be modified later to take account of unforeseen changes) can be a great help. The planned or projected increase in average income per head provides a starting point for a rational decision as to the rate at which wages should be encouraged to increase.

This does not mean that governments will necessarily favour equal rates of increase for all incomes. A government might, for example, decide that average wage incomes should be encouraged to increase rather faster than the average of all incomes. It might favour this because of evidence that wages were in many cases too low to cover the cost of living at a level satisfying the basic needs of workers and their families or because it believed that the share of national income going to entrepreneurs and landowners was more than was needed in order to call forth a sufficient supply of enterprise and investment capital.[1] Or a government might decide that in the national interest wage incomes, for a time at least, should preferably rise rather more slowly than the average of all incomes. It might consider that its growth targets could not be attained without raising the rate of investment, using for this purpose a high proportion of annual increments of production; or it might consider that the main feature of a policy for minimum living standards should be the provision of productive employment for unemployed or underemployed workers, and that this should have priority over a policy for raising the wages of those already employed. It seems important in any case that governments, having determined their major policy objectives in terms of investment, employment, the balance of payments, and so on, should ascertain what these objectives imply as regards the room for wage increases.[1] Or a certain rate of increase in wages may be taken as one of the policy objectives, in which case other objectives will have to be accommodated to it.

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[1] No government, of course, would regard wage policy as the only instrument for ensuring an equitable distribution of the fruits of economic progress; fiscal policy, including the progressive taxation of large incomes and perhaps capital gains taxes and land taxes, has an important part to play.

If a government decides that the national interest demands a wage policy calling for some patience and forbearance on the part of workers, asking them to adapt their demands to the pace and requirements of economic growth, and to make special efforts to improve their qualifications and performance before any substantial increase in their earnings is possible, such a policy will be felt to be inequitable and will prove unacceptable to workers and their representatives, unless accompanied by two things: first, an equitable fiscal policy to ensure that any wage restraint is matched by similar restraint on the growth of other incomes, at least after payment of taxes; and second, on effective policy to promote the economic growth in the name of which wage restraint has been called for.

In taking a view about the " room for wage increases " governments will wish to bear in mind, among other things, considerations relating to costs, prices, the balance of payments, the rate of investment, the rate of growth, the level of employment, and the motivation of the labour force. The last of these points is perhaps more conveniently discussed in connection with the structure of wages, to which we turn on pages 228 to 234; the other points are discussed briefly in the following pages, necessarily in rather general and theoretical terms, since there has been very little systematic study of these considerations in developing countries.

Costs.

The extent to which higher wages will raise industrial costs depends partly upon the proportion of wage costs to total costs in industrial production, and partly upon how far, if at all, productivity increases in response to higher wages. If labour productivity does increase, the extent to which this will offset the effects on costs of an increase in wages will depend on whether the increase in productivity is costless (apart from the wage increase) or whether it is achieved only at the cost of increased capital or managerial inputs.

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[1] It will be important to know, for example, whether wage incomes may be allowed to rise more rapidly or must be prevented from rising as rapidly as in the recent past.

In many economies, including developing countries, the share of wage costs in total costs of industrial production is less than 25 per cent., often much less.[1] This suggests that even fairly substantial wage increases might often have only rather moderate effects on cost levels in the industrial sector. However, since the products of some undertakings are the materials or the bought-out components of others at later stages, an increase in wages may, for plants in later stages of production, raise the costs of materials and components as well as of labour (though not if the materials or components are imported or are purchased from the subsistence sector).

The effects of wage increases on productivity call for much more thorough study than they have yet received. A distinction may be drawn between productivity increases achieved with and without increased capital investment. It is well known that wage increases give entrepreneurs an incentive to substitute capital for labour. This will increase the productivity of the labour they continue to employ but will require investment resources and make capital scarcer in the rest of the economy. It is sometimes said that if (and to the extent that) productivity increases without any increase in capital investment, this will offset the effects on costs of higher wages, and that there are three reasons why this may happen. The reasons are as follows:

(a) entrepreneurs may organise the work more efficiently and make better use of the services of their workers when they have to pay higher wages;

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[1] The following statistics, relating to certain countries for which information is available for a recent year, show the percentage share of wages and salaries in the gross value of production in the extractive and manufacturing sector:

Country	Percentage share	Country	Percentage share
Africa:		*Asia:*	
Ghana (1964)	18	China (Taiwan) (1962)	10
Morocco (1961)	15	Japan (1962)	12
Mozambique (1961)	18	Turkey (1962)	14
Tunisia (1962)	14	*Industrialised Countries:*	
United Arab Republic (1961)	10	United States (1963)	24
Zambia (1963)	23	United Kingdom (1958)	22
Latin America:		Federal Republic of Germany (1962)	16
Brazil (1962)	18		
Ecuador (1963)	12		

Source: Derived from data contained in *Statistical Year Book, 1965* (New York, United Nations, 1966).

(b) the physical efficiency of workers may improve if, with higher wages, they become better fed and healthier;

(c) the psychological adaptation of workers to their work may improve; as they may become more anxious to give satisfaction and retain their jobs, absenteeism and labour turnover may fall.

The first of these reasons seems likely to operate only if there are increased managerial and supervisory inputs, involving either an increase in time and effort expended by an existing staff or an increase in the size of the staff. In connection with points *(b)* and *(c)*, it seems that, while higher wages may in certain circumstances increase the workers' capacity for work and their willingness to accept the discipline and demands for a higher level of output, unless management knows how to bring this about and makes the necessary effort it is unlikely to occur spontaneously, at least to any very significant extent.

It is highly desirable that more should be known about the conditions in which, and the extent to which, higher wages may be expected to lead to higher productivity without increases in capital investment. Cross-section studies that show high wages associated with high productivity in some firms and low wages associated with low productivity in others are not conclusive evidence that higher wages lead to higher productivity. In the first place, the high-wage, high-productivity firms may employ more capital per worker; in the second place, they may attract and retain the pick of the labour force. For them a high-wage policy may be good business; but this may show only that there is room for a certain number of high-wage firms in the line of business concerned, not that all firms would make higher profits if they paid higher wages.

Prices.

If higher wages lead to higher costs, entrepreneurs are likely to try to recoup this by charging higher prices. To the extent that they succeed, the costs of higher wages are passed on to consumers. To the extent that consumers buy less than they would otherwise have bought, production and employment will fall, or will rise less than they otherwise would have done, and the costs of higher wages will be shifted in part to those who lose their jobs or fail to find jobs. The jobless are likely to be poorer than the wage earners; consumers, on the average, may be either richer or poorer than wage earners depending on whether the products in question are articles of mass consumption or luxury goods.

The Balance of Payments.

Producers for an internal market, if they are all simultaneously required to pay higher wages, may not have too much difficulty in raising prices. But producers for export, facing competition from other countries, may find it harder to do so, and the same situation arises if producers for the home market have to meet competition from imports. In these two cases, higher wages tend to place producers under a competitive disadvantage that will threaten to reduce the country's export earnings or increase its import bill.

Investment.

The view that higher wages are bad for economic growth and industrial development because they divert resources from investment to consumption is over-simplified. It postulates that higher wages transfer purchasing power from entrepreneurs, who save and invest, to wage earners, who consume. It is true that wage earners in developing countries can seldom save much. But, as stated above, it is by no means certain that wage increases divert purchasing power to workers from entrepreneurs. The burden may be shifted in whole or in part to consumers or to the jobless. Even if higher wages are paid for out of profits, it is not certain that this will be at the expense of domestic investment; it might be at the expense of conspicuous consumption or the purchase of overseas assets.

The effect of wage increases on the distribution of resources between investment and consumption thus seems very uncertain. Their effect on the character of investment seems more predictable. To the extent that they induce entrepreneurs to substitute capital for labour they tend to divert some capital from labour-using to labour-saving projects. Some capital that could have been used to provide new jobs and increase production tends to be used instead to replace labour in existing uses.

Growth.

If and to the extent that higher wages do divert resources from investment to consumption (we have seen that it is by no means certain that they will have this effect) this will be bad for economic growth in circumstances in which growth is limited by a shortage of capital—and there is no doubt that this is the case in most developing countries most of the time. It is sometimes argued that a diversion of resources from investment to consumption will be good for economic growth and industrial development, because it will enlarge the market for industrial products. This contention raises a number of complicated issues. It is pointed out, for example, that in spite of the general shortage of capital there is often a great deal of unused industrial capacity in developing countries. Even when this is true, it is not certain that the reason is lack of demand. It may be evidence, rather, of a lack of balance in a country's investment programme, some equipment having been brought into existence before it can be used because materials, power or complementary equipment or skilled labour are not yet available in the quantities needed. Even if there is a lack of demand, it is not certain that higher wages will remedy the matter. Normally an increase in wages transfers, rather than creates, purchasing power (unless the banking system creates additional money with which to pay the higher wages). The people from whom the purchasing power is transferred—entrepreneurs, consumers or those who lose their jobs—will have less to spend. The contention we are examining seems to assume that the purchasing power that higher wages transfer to certain workers comes from entrepreneurs who would have spent it neither on consumption nor on investment goods. While this is conceivable, it is rather a special case, and it is not certain that higher wages will be the best remedy. Governments might prefer to boost demand by increasing their programmes of public investment or public consumption.

Employment.

Finally, higher wages have effects on employment. This is perhaps less relevant to industrialisation programmes than the other considerations on our list, since the primary concern of such programmes is to stimulate industrial production rather than employment. But, particularly in countries with surplus labour, it cannot be a matter of indifference to a government whether an industrialisation programme provides a reasonable number of jobs or leaves masses of people jobless. In most ordinary circumstances it must be expected that when they have to pay higher wages some entrepreneurs will employ fewer workers, not necessarily than they have employed in the past, but than they would have employed at lower wages. Very little is known, however, about the degree of responsiveness or elasticity of the demand for labour in developing countries in the face of wage increases. In one developing country, Puerto Rico, it was estimated that between 1949 and 1958 a change in wages could be expected to be associated with an approximately equal proportionate change in employment in the reverse direction.[1]

This necessarily very inconclusive discussion of factors influencing the " room for wage increases " points to the need for more systematic study of the effects of higher wages in developing countries.

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[1] L. G. Reynolds and P. Gregory: *Wages, Productivity, and Industrialisation in Puerto Rico* (Homewood, Illinois, Richard D. Irwin, 1965).

The Structure of Wages and Salaries

Having assessed what order of magnitude of total and average wage increases seems compatible with other national objectives (though being ready to review this in the light of changing circumstances), governments are also likely to have views on the distribution of the total available for wages and salary increases among different categories of workers. There seem to be two main criteria to be borne in mind in this connection: equity and productivity. Ideas of equity are largely subjective, but it is generally considered inequitable that certain workers should be paid less than the " going rate " in a country for work of a given degree of skill and difficulty. Considerations of equity may also favour raising the wages of unskilled workers more than those of skilled workers. The productivity criterion will favour distributing wage increases in whatever way will promote economic growth and the social progress that this makes possible. Broadly speaking, this means seeking to adapt the structure of wages and the methods of wage payment so as to give workers the strongest possible incentive (i) to acquire needed skills; (ii) to take jobs in which there is a shortage of labour; and (iii) to improve the quantity and quality of their output in their chosen jobs. In some countries it is also important to provide incentives for a larger number of workers to commit themselves to an industrial way of life.

In many ways the dictates of equity and of productivity coincide in matters of wage structure. In the case of the occupational wage and salary structure, the differentials that are needed to induce workers to learn higher skills will often also be accepted as a just recompense for their willingness to undertake the training required. Interregional and inter-sectoral wage and salary differentials of a reasonable magnitude may also be regarded as equitable in so far as they compensate workers displaying the required mobility for the trouble involved. There are, however, occasions when equity and productivity requirements are in conflict. For example, if international freedom of movement is maintained, the wage or salary in the case of certain highly skilled workers may need to be considerably higher than is considered " fair " in the context of the country in question if these workers are to be dissuaded from emigrating to richer countries.[1] Where equity and productivity requirements are in conflict, the question of how much weight should be given to each is a policy problem. In the present paper, dealing as it does with how wage policy can help to promote industrial development, our main concern is with the productivity aspect of the wage and salary structure. But we have already insisted (on page 221) that wage questions cannot be treated in the light of what is expedient only—even for so important a purpose as industrial development—but call for due consideration of the needs and dignity of workers as men and women. Moreover, it should be appreciated that a wage system that is regarded by a significant part of the community as being, in some sense, inequitable can endanger the industrialisation process on account of the social unrest it generates as easily as if it failed in its economic objectives.

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[1] " Middle-class earnings are much higher in relation to average earnings, or to the earnings of small farmers or unskilled workers, in the less developed than they are in industrial countries. This is partly due to the greater shortage of middle-class skills, but it is also due to the greater mobility of the middle classes, as between richer and poorer countries, which enables them to demand in poorer countries as high a standard of living as they could get in richer countries." (W. A. LEWIS: *The Theory of Economic Growth* (London, Allen and Unwin, 1960), p. 228.)

Three aspects of the efficiency of the labour force that are strongly influenced by the wage and salary structure were identified above.[1] These are closely linked with, respectively, the long, medium and short terms. Thus, occupational wage differentials should be such that they help to ensure that in the long run a sufficient number of people acquire the skills and qualifications necessary for industrial development. More immediately, it is important that wage differentials are such that the labour force, given the skills that it possesses, is appropriately allocated between regions, sectors and industries. Thirdly, in the short run, it is necessary that the system of wage payment be such that workers are encouraged to perform reasonably well in the jobs where they find themselves.[2]

It should be emphasised that in each of these three roles wage policy needs to be accompanied by other measures. Thus, the appropriate manipulation of occupational wage differentials by itself is quite insufficient to yield the required pattern of skills in the labour force or to bring about a general improvement in the capabilities of workers in developing countries. The provision of training facilities is equally or even more important; so is good management of the labour force, including the provision of opportunities for promotion and recognition. But a suitable occupational wage structure can provide incentives for the acquisition of the skills that are required, though wage differentials are not the only way of doing this: non-pecuniary job advantages may also be used. Similarly, some regional and sectoral redistribution of a labour force will occur automatically in response to the distribution of job vacancies [1], and can also be promoted by an appropriate housing policy. Providing more information about the situation of the labour market, reducing the costs of mobility and breaking down certain barriers of tradition can all help to make the labour markets of developing countries operate more smoothly and promote the mobility and structural changes which the industrialisation process requires. In the case of performance in a given job, incentives to greater effort can be afforded by schemes that provide for worker-management co-operation, and by applying moral incentives.

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[1] See p. 228.

[2] See *Report on the World Social Situation, 1965*, op. cit., Part II of which, prepared by the I.L.O., contains a much fuller treatment of the subject of incentives in industry than can be attempted here.

Skill Differentials.

It is difficult to generalise about whether, in relation to efficiency requirements, occupational differentials are too wide or too narrow in developing countries. In the first place, the pattern differs considerably from country to country, and in the second, the picture varies from one part of the occupational wage and salary scale to another. Thus, it may be that manual skill differentials are often too narrow at the lower end of the wage scale to afford sufficient incentive for the acquisition of minor, though by no means unimportant, skills.[2] This " bunching " of wage rates at the lower end of the scale can be largely attributed to the existence of a wage " floor " which, in developing countries, is relatively near to the average. Several factors are responsible for this, among them the need to pay a minimum wage for unskilled workers that is high enough to attract workers from the traditional agricultural sector on a permanent, full-time basis. Such commitment on the part of workers is vital if there is to be sufficient time and incentive to train them for higher skills.[3]

There is little doubt, however, that in many developing countries certain occupational differentials are, in general, not only too wide but frequently lie in the wrong direction. This is particularly true in the case of differentials between certain non-manual occupations and manual skills which, despite the greater shortage of workers in the latter category, clearly favour the former. Some impression of the size of these differentials in developing regions, and the contrast with the situation in developed regions, can be gathered from the following data comparing the wages of garage mechanics with the salaries of bank tellers:

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[1] There is some evidence that the distribution of job vacancies has contributed more than wage differentials to the redistribution of the labour force in developed countries. See O.E.C.D.: *Wages and Labour Mobility* (Paris, 1965). This mechanism is likely to be at least as important in developing countries, given the reserve of unemployed workers they frequently contain.

[2] H. A. TURNER: *Wage Trends, Wage Policies and Collective Bargaining: the Problems for Underdeveloped Countries*, (University of Cambridge, Department of Applied Economics, Occasional Paper No. 6 (1965)), p. 19.

[3] It has been proposed that the wage structure could also promote such commitment by providing for relatively large wage increases after one or two years' service with the same employer (*Report on the World Social Situation, 1965*, op. cit., p. 45).

MEDIAN OF GARAGE MECHANICS' WAGES AS A PERCENTAGE OF THE MEDIAN OF BANK TELLERS' SALARIES, BY REGIONS

Region	Percentage
Africa	67.4
Asia	99.2
Latin America	65.8
Western Europe	101.3
Australasia	121.2
North America	125.8

Source: Derived from data presented in " Results of the I.L.O. 1963 October Inquiry ", in *International Labour Review*, Vol. XC, No. 1, July 1964, Statistical Supplement.

Such anomalies in the wage structure are due partly to imperfections in the labour market, and partly to the strong influence of traditional views and concepts of status. In any event, it is clear that the skill and occupational differentials which derive from current systems of wage determination in developing countries are by no means in full accordance with productivity requirements.

Allocation of the Labour Force.

The wage structure can play an important role in promoting the required sectoral and regional distribution of the labour force. It has already been pointed out that the minimum rate offered to unskilled workers can help to ensure that the industrialisation process is not held up by a shortage of labour from the underemployed reserves in the rural sector. This may be important in very early stages of industrialisation, but in most developing countries now the problem is rather one of finding jobs for unskilled workers than workers for unskilled jobs. No less important, however, is the impact of the wage structure on the distribution of labour within the industrialised sector. If wage differentials are such that they attract labour to those areas and sectors—export industries and infrastructure activities—where development is first generated, they can do much to promote the industrialisation process. There is certainly evidence that workers do respond to such differentials. Thus, " in West Africa the migrant who leaves the village for income earning outside has many alternatives before him, knows about the differentials that exist in the different kinds and places of work, and tends to migrate where (other things equal) returns are greatest and conditions best ".[1]

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[1] Elliot BERG: " French West Africa ", in W. GALENSON (ed.): *Labor and Economic Development* (New York, 1959), p. 197.

Efficiency on the Job.

The method of wage payment adopted for a job can have a very powerful influence on the speed and effectiveness with which an employee works. Attention has already been drawn to the manner in which the "commitment" of an employee to the industrial labour force, and thereby his value as a worker, can be strengthened by the general level of his remuneration. Usually, however, the discussion of methods of payment and the effectiveness of the labour force in developing countries centres on the question of the desirability and extent of use of piece rates.

In general, conditions would appear to favour a greater use of piece rates in developing than in developed countries. There are several reasons for this: there is a stronger quest for basic human necessities; the nature of many of the tasks in these countries lends itself to piece-rate systems; workers in developing countries vary considerably in their efficiency; and, where investment is more risky though no less expensive, employers wish to limit the size of overhead costs and make maximum use of their equipment, objectives which are promoted by the use of piece rates. Given, on the one hand, the attraction of making wage payments highly variable with respect to output and, on the other, the limitation imposed on this goal by the fact that in developing economies much remuneration is already in the form of non-variable allowances, it is not surprising that, in India for example, surveys have revealed "a widespread application of incentive schemes".[1] Even so, in developing countries as a group, there is probably considerable scope for the extension of payment by results in industry.

Not all work, however, lends itself to payment by results. One essential condition is that the work flow can be measured. Another is that output bears a direct and measurable relationship to labour performance, either of the individual or (if a group incentive scheme is used) of the group. When the range of labour performance is limited and is strictly dictated by the technical requirements of the task, there is no logical basis for payment by results, since changes in output would be due to factors other than labour performance such as the flow of raw materials or freedom from mechanical and power breakdowns. To the extent that these conditions are becoming more widespread in industry, the scope for payment by results may tend to narrow with the passage of time, as it appears to have done in some centrally planned economies. However, some developing countries try to take advantage of their relatively abundant supply of labour, and to cope with their shortage of capital, by utilising more labour-intensive techniques than would be remunerative in countries in which capital was cheaper and labour dearer. Hence the scope for payment by results in industry in developing countries may remain wider than in developed countries so long as there is a substantial difference in the proportions in which labour and capital are available.

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[1] *Report on the World Social Situation, 1965*, op. cit., Part II, p. 71.

The conditions mentioned at the beginning of the last paragraph are necessary for the operation of a system of payment by results; but for its successful operation another important feature is efficient management to ensure sound methods of production, reliability of equipment and good industrial relations. Indeed these aspects of management are often so critical in the operation of payment by results that it is a moot point whether the stimulus to better work provided by the system, or the standard of management required for its operation, deserves the credit for increased productivity. It is important that the introduction of any payment by results scheme should proceed at all stages with full consultation of the representatives of the workers affected.

Job Evaluation.

A topic that cannot be developed in this paper for lack of space, but that should not be passed over in silence, is the contribution that job evaluation can make to the establishment of a satisfactory wage structure. In the words of an I.L.O. study—

> Job evaluation may be defined simply as an attempt to determine and compare the demands which the normal performance of particular jobs makes on normal workers without taking account of the individual abilities or performance of the workers concerned.[1]

There appears to have been progress in job evaluation in recent years in the following respects:

(a) The field of application of job evaluation methods has been extended. The I.L.O. study just cited emphasised that these methods had chiefly been applied to manual work because of the difficulties attending their extension to managerial and supervisory occupations; some progress seems to have been made in overcoming these difficulties.

(b) New methods of applying job evaluation techniques have been developed.

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[1] I.L.O.: *Job Evaluation*, Studies and Reports, New Series, No. 56 (Geneva, 1960), p. 8.

(*c*) Workers' organisations seem more favourably disposed than in the past to the elaboration of wage structures based on job evaluation.

INSTRUMENTS OF WAGE POLICY

Governments that have views on the desirable level and structure of wages, and want to encourage certain wage movements and discourage others, will also have to decide what instruments to use for this purpose. The main instruments available in most countries are minimum wage fixing, and the determination of the wages and salaries of government employees.

Systems of minimum wage fixing are of many different kinds. Sometimes minimum wages are fixed by industry or region by wage boards more or less on the model of the British wages council system; this is the case in many Asian, African and Latin American countries. Sometimes there is a national minimum wage on the pattern of the French guaranteed inter-occupational minimum wage [1], as in French-speaking African countries. Even when there is a national minimum wage, this may not apply (because of difficulties of enforcement) to certain sectors such as agriculture and domestic service, or to firms below a certain size. Sometimes, as in the United States, the minimum wage is a sort of safety net spread well below the prevailing level of wages, the purpose of which is to prevent any individual wages from falling too far below the general level. In other cases, including many developing countries, the minimum wage is effectively the going rate for most of the workers covered by it. Sometimes minimum wages are fixed only for unskilled work, skill differentials being left to be negotiated in collective or individual agreements; in other cases there are more or less elaborate schedules of minimum wages for different occupations.

The extent and directness of the influence on the level and structure of wages that governments are able to exert through minimum wage fixing vary. This influence is weaker, for example, when the minimum wage system merely spreads a safety net below the prevailing level of wages than when most workers are paid at the minimum rates. But even if only a minority of workers have their wages directly fixed by the government, usually in consultation with employers' and workers' representatives [2], wage determinations may have a much wider influence.

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[1] *Salaire minimum interprofessionel garanti (S.M.I.G.).*

[2] The I.L.O.'s Minimum Wage-Fixing Machinery Convention, 1928, and Minimum Wage Fixing Machinery (Agriculture) Convention, 1951, insist on such consultation.

In every country there is a certain rigidity in the structure of wages. If some workers get higher wages because of a wage determination, others may demand and get higher wages too, employers recognising that there will otherwise be conflict and dissatisfaction at the upsetting of accepted wage parities and relativities.

This same tendency towards rigidity in the wage and salary structure likewise increases the influence of a second instrument of wage policy—namely the decisions made by a government in fixing the wages of its own employees. In developing countries, where most workers are peasants, not wage earners, not only is the government usually by far the largest single employer of labour, but it often employs a very substantial proportion of all wage earners. In these circumstances the level and pattern of wages it establishes for its own employees cannot fail to exert a major influence on the level and pattern of wages throughout the economy.[1] In some West African countries, for instance, wage negotiations in individual firms have very largely waited on the decisions made concerning the pay of government employees—decisions which, though subject to joint discussion, are of course a responsibility of governments themselves.

Two other instruments of wage policy may be mentioned briefly. One is that in many countries governments have power to decide whether or not to extend the provisions of a collective agreement to other employers and workers who are not bound by it as contracting parties. The other has to do with the role of government-appointed mediators or arbitrators in case of industrial disputes. It is sometimes said that the role of mediators or arbitrators is to help the parties to find, or themselves to find, terms on which a dispute can be settled, and that in this role they cannot be briefed or instructed by governments without forfeiting the confidence of one or both of the parties to the dispute. It is for governments to decide whether they wish to use mediation and arbitration machinery to promote the settlement of disputes on any terms acceptable to the parties most directly concerned, or whether they wish to use such machinery as an opportunity for bringing wider considerations of the public interest to bear in the search for a settlement.

Finally, consideration might be given to the advantages of trying to forge a new instrument of wage policy in developing countries, namely a simple standard scheme of job classification and grading, as has been suggested in some I.L.O. technical co-operation reports. This could be a first step in the direction of applying job evaluation techniques

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[1] Governments may also influence the wages and conditions of work of workers employed by private enterprise on public contracts.

(see pages 233 to 234 above). There is no doubt that the present structure of wages in many developing countries is chaotic and not related to their present needs. It reflects a shortage of literate workers, which is gradually being overcome through education, and it tends to undervalue technical skills. Anomalies will probably be slow to yield to the pressures of demand and supply unless some public guidance is given. An attempt by governments, in consultation with representatives of employers and workers, to group occupations into a relatively small number of broad skill categories and to indicate what, in their view, would in normal circumstances constitute a reasonable proportional relationship between the wages of the different skill categories might play a valuable part in helping to bring about—by example, persuasion and, if possible, agreement—a wage structure better adapted to the needs of industrialisation and economic growth.

INTERNATIONAL ACTION

Action by international organisations can do much to help developing countries both formulate and implement a wage policy. Assistance in the formulation of wage policies that promote the industrialisation process can proceed along two paths. First there is a need to consider the many and complex relationships that exist between the level and structure of, and changes in, wages and the various elements of the industrialisation process. The need for more understanding of the relationships briefly discussed on pages 223 to 227 above has been emphasised. National studies of these relationships will be extremely valuable. But, in addition, comparative international studies can be carried out by international organisations, which may help to clarify broad general principles of wage policy. The I.L.O. intends to undertake further studies of payment by results and job evaluation in the context of the need for developing countries to achieve industrialisation as part of the process of economic growth. Problems of wages in relation to industrialisation were among the subjects studied at an interregional seminar on the determination and protection of wages organised in Denmark jointly by the I.L.O. and the Danish authorities in August and September 1967. Similar meetings might be organised within the framework of future technical co-operation programmes.

There is also a need for general principles to be adapted to the particular economic and social conditions that obtain in a given country. The technical expertise that this requires is frequently not available in developing countries and is everywhere in short supply. The necessary expertise may be provided at the international level in the form of technical co-operation; the I.L.O. recruits and sends to developing countries experts who advise governments, on request, about the objectives and instruments of policies relating to wages. Advice can also be made available in regard to the installation of appropriate systems of payment by results, and in regard to the use of job evaluation techniques.

The I.L.O.

The International Labour Organisation was founded by governments for the purpose of international collaboration in securing the permanent peace of the world and eliminating social injustice through the improvement of conditions of labour. A special feature of its structure is that representatives of management and of labour organisations participate with government representatives in its proceedings. Established in 1919 it became in 1946 the first specialised agency associated with the United Nations. It has more than 100 member countries.

Over the years the I.L.O. has built up a large body of international agreements (" Conventions ") and recommendations relating to basic rights of labour, employment and training, conditions of work, social security and protection at work. These are the result of detailed discussion at the annual International Labour Conference, comprising four delegates (two representing the government, one representing management and one representing labour) from each member country, speaking and voting individually. The Conventions and Recommendations are not automatically binding, but governments must submit them to their national legislatures; a Convention becomes binding upon ratification. Reports from the different governments on their implementation are examined annually by the Conference and there is also machinery for examination of complaints, including alleged violations of freedom of association.

Another major sector of the I.L.O.'s work consists in the provision of expert advice and technical assistance in matters connected with labour and social policy. Assistance is provided under the United Nations programmes of technical co-operation as well as under the I.L.O.'s regular budget. Much of this operational work lies in the fields of manpower training and utilisation, improvement of work methods and organisation, labour administration and the development of effective systems of industrial relations and social security.

These activities are organised by the International Labour Office, an international staff in Geneva with a field network in most parts of the world. The Office is also the permanent secretariat of the Organisation, and a clearing-house for international information and research. It is headed by a Director-General appointed by a Governing Body of 24 government representatives, 12 representatives of management and 12 representatives of labour, which meets three times a year.

In addition to the activities mentioned, matters of concern to particular regions and industries are discussed periodically by special conferences and committees, and many specialised technical meetings are organised. An International Institute for Labour Studies, set up by the Organisation at Geneva, provides persons occupying positions of responsibility in the different countries with opportunities for advanced study of labour policy questions.

All these activities are closely co-ordinated with a view to fulfilment of the purpose for which the International Labour Organisation was created—the promotion of social justice and peace.

Price: $U.S. 2.50 or 17s.